Commodore HORIZONS

The independent Commodore magazine

75p April 1984

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BUSINESS AND GAMES SOFTWARE REVIEWED

UNDERSTANDING THE GRAPHIC COMMANDS

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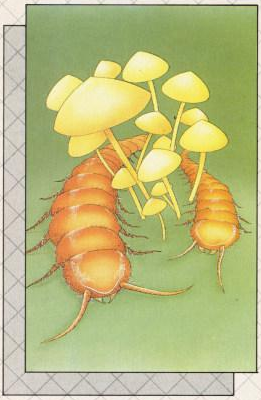

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The object of this game is to defend your city against an onslaught of suicidal aliens.

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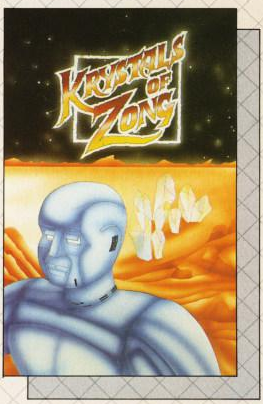

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Your object is to overcome various obstacles and overpower creatures intent on stopping you as you progress on your quest for the Krystals of Zong. Quick reactions will be necessary if you are to succeed clues will guide you.

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The independent Commodore magazine

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EDITORIAL

DEPARTMENTS OF DISINFORMATION or Ministries of Acute Marketing? It's hard to work out which is the most accurate interpretation of many microcomputer companies' activities.

Product announcements can precede the arrival of working models by many months — and even then any users finding bugs may think that "working" is an over-generous description. Stories of demonstration models being driven by outside boards, or even other micros, offer little reassurance. Other companies, mini and mainframe manufacturers, are said to have displayed "hands-off" models protected by glass cases, while one launched a machine by showing it on video. Similar stories circulate about software houses. For example, passing off the arcade version of a game due to be released on cassette as the actual micro offering.

It makes it hard to say exactly what a company intends to do, let alone when. Perhaps some of the doubt arises because firms have to change their plans in the light of rivals' announcements. Customer demand can also prompt manufacturers to revise their plans — if you announce that you intend to drop a product but demand for it continues, then there's an obvious temptation to change your mind. Companies can also face problems with outside suppliers. If a particular chip is hard to get hold of while a cheaper equivalent with the same specification is readily available, then a change in supplier is bound to be considered. Working out how many machines to stockpile for a busy period like Christmas is also difficult, with market projection sometimes sounding suspiciously like a euphemism for guesswork.

It's hard to work out whether this flux is deliberate or merely inefficient. For instance, some of our 64 readers had problems getting hold of Commodore cassette decks. A cynic might be forgiven for wondering if sales of cartridges and/or disk drives increased during this period.

Waiting for the new Commodore micros promises to be equally intriguing. There have already been conflicting reports in the US press on when these machines will be available. As these are modular models, there's plenty of room for manoeuvre. But if memory serves as well, a Vic 10 and 30 were once expected to take their place beside the 20. The Vic 10 had a low quality keyboard with some features for synthesising music. The Vic 30 had the 20's keyboard as well as 16K of RAM. Don't write to ask where these machines are now, because we wouldn't be able to tell you. However, we're curious about how similar the Vic 10's keyboard is to the one on the 116, the possible junior in the new 264 family. Keeping users in suspense, and competitors off your track, may yet end up being a rewarding marketing policy.

DISK GAMES

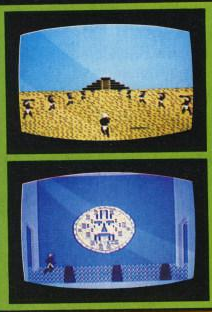
FOR THE **commodore** 64

If you've got a 1541, you don't want to spend ages waiting for cassette games to load. Freed from the restraints of loading times, Audiogenic Disk Games can give you typically around 30K of machine code! More code means better games, better graphics and sound, more variation, and those little extra touches that you will come to expect from a game. Here are our first great releases!

FORBIDDEN FOREST

Forbidden Forest is more of a quest than just a game! The action takes place in a four dimensional scrolling forest landscape which many have entered, but none has returned. Yes, I did say FOUR dimensional - day fades into night as the action unfolds! The quest is to seek out and destroy the Demogorgon, mystic ruler of the Forbidden Forest. Before you can even set eyes on him you will have to contend with his army of fearsome creatures, including mutant spiders, showers of giant frogs, snakes, dragons, skeleton soldiers and more! You have only your trusty bow and arrows to depend on!

*



AZTEC CHALLENGE

A challenge on an epic scale! Aztec Challenge takes you on a journey to Mexico and the ancient pyramid of Tenochtitlan. The ancient Aztec gods and their devotees have ensured that no ordinary human can learn the secrets of the temple and live to tell the tale. The pyramid is protected by all manner of treacherous traps and hidden perils - an epic test of your courage and cunning. Aztec Challenge features no less than seven totally different screens - here are just three of them - each of which presents a brand new challenge. We hope your joystick can stand up to it!

*

SLINKY

Slinky, the spring, was having fun hopping about when suddenly he came upon a pile of coloured blocks, so he thought he'd play around on them for a while. Much to his amazement he found that they changed colour when he landed on them. Wow! But unknown to him, the blocks belonged to the Wicked Wizard, who sent his friends along to tease our poor hero. Slinky is a real fun package with ninety-nine levels, amazing reward displays, and action replays. Where else could you meet such charming characters as Dusty the dust cloud, Marge the magnet, Ralph the random raindrop, and Lorenzo the chameleon hopper?

*

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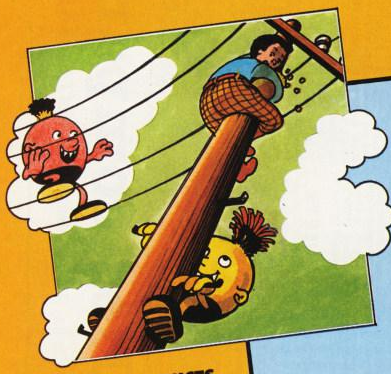

FRANTIC FREDDIE

Frantic Freddie is fun all the way! Played to an unbelievable soundtrack of brilliantly arranged tunes, Frantic Freddie contains all the ingredients that make a game into a classic! Freddie is a telephone line engineer who has to climb up and down the telegraph poles, picking up pots of gold and avoiding the dreaded Greeblies. The Greeblies take on a different form with every new screeen, but one thing's for sure - they may look cute, but they show no mercy! Frantic Freddie also features wacky messages, funny interludes and silly bonuses. Frantic Freddie - a game with a sense of humour!

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PEGASIS

Pegasis takes us back to the mythical age when the battle between Good and Evil was fought by heroes on winged steeds. As the champion of the forces of Good, you must topple the evil Black Warriors from their jet black flying horses by swooping down on them from above, then land and finish them off before they can remount. In order to keep airborne, you must keep your wings flapping with the joystick Fire button, and control direction with the stick. The brilliant programming of Pegasis gives you stunning graphics, bonus creatures, great wing flapping sound effects, an incredible simulation of flying horse aerodynamics, plus - two players can play at the same time!

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(b) 1530 cassette unit	£40	(f) Epson FX80	£400	(j) Package (a) + (c)	£387
(c) 1541 disk unit plus Easyscript games	£199	(g) Parallel printer cable + software	£25	(k) Interface to convert any cassette recorder for 64 use — it's excellent	£25
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software selection

This is a selection of some of the best programs for the Commodore 64 from a list of over 500 we can supply, covering the products of 100+ software houses from the UK, rest of Europe, and the USA. A 20-page listing and later updates are available free to customers (otherwise 50p and large SAE, credited against first order). Add 50p p&p for orders under £20, Europe £1.

Please note that the prefix (d) before a price denotes that the program is available on disk (for example d25). The prefix (r) (as in r29) indicates that the program is in cartridge form and costs £29.00. Tape program prices have no prefix. Thus (d29 16) indicates a disk version at £29.00 and a tape version at £16.00.

WORD PROCESSING

PAPERCLIP (d90) is the most sophisticated and versatile wp program for the 64. Very good too is **VIZAWRITE** (r68 d65) which has a spell-check program **VIZASPELL** (d20 if bought with **VIZAWRITE**, else d65). But for casual wordprocessing of extreme sophistication we recommend **HOMEWORD** (d35) which is outstanding value and very easy to master. It uses 'icons' to symbolize menu options (as used by Lisa). Contains several really innovative features. Much further down the scale but ideal as a low cost text editor is **WORD WIZARD** (5.99). Compatible labelling programs are available.

UTILITIES

BACKUP & FILECONE (15) are two programs for duplicating valuable tape programs — the first being capable of copying almost all protected programs. Tape-to-disk and disk-to-disk versions of this truly useful program will be available soon. **1541 BACKUP** (d 13 11) duplicates disk-based program material which is unprotected. **DISKEY** (d36) is a really powerful disk editor. **PROGRAMMER'S UTILITIES** (d14.99) surely represents the best value if you have a disk unit: sprite, character, and sound editors are provided in addition to a PET emulator, and disk copy utilities — a dozen in all! **COMPACTOR** (d10.50 8.50) cuts out all wasteful programming including REMs and spaces. This can speed up programs and salvage memory. Various good quality sprite and character editors are available including **SUPERFONT** 4.00 (6.75) **SPRITE/GRAPHICS EDITOR** (5.99) **SPRITEMAKER 64** (6.75). On the music side **MUSIC COMPOSER** (r9.99), **ULTISYNTH** (14.95), **SYNTHESOUND** (r25 d25) and **MUSIC 64** (d9 6.50) can all be recommended. **GRAPHIX 64** (d13.50 11) helps you to use the fabulous graphics capabilities.

PROGRAMMING AIDS

These range from improvements to C64 BASIC to actual programming aids. **SIMONS BASIC** (r50) adds 114 extra commands and facilities, and the rather better planned program **BC BASIC** (r50 17.95) does much the same. Best of the compilers and excellent value is **PETSPEED** (d50). For tape users there's **DTL-BASIC COMPILER** (35). **POWER 64** (d72) is a most useful programming tool with many easily learnt features. On the machine code front there are numerous monitors and assemblers the best of which is **MIKRO ASSEMBLER** (r53) but **MONITOR** (r29.95) **ASSEMBLER 64** (6.75) **ASSEMBLER DEVELOPMENT** (d24.95) **HESMON 64** (r29) **MASTER-CODE ASSEMBLER** (14.95) and **PAL 64** (d72) — a suite of programs — can all be recommended. If you want to learn about machine code programming we suggest **ASSEMBLER TUTOR** (d29.95 29.95) or Honeyfold's **BEGINNER'S ASSEMBLY LANGUAGE PRORAMMMING** (14.95). A multifunction utility which adds many disk commands of the 64 is the highly recommended **VICTREE** (r56). **ARROW** (r44) has a TIM monitor, Renumber and Delete facilities, and offers a sevenfold increase in tape LOADs and SAVEs.

DATAFILES/DATABASES

Unquestionably the one program to have if you can afford it is **SUPERBASE 64** (d88) which we have on special offer by way of encouragement! This is a sophisticated programmable relational database. Think of what you would like your database program to do — and SUPERBASE will probably be able to do it! Very, very powerful and very, very versatile. **INFODISK** (d73) and **DELPHI'S ORACLE** (d90) are very similar and offer larger individual records but more restricted programming constraints. Multifunction database/word-processors include **MAGPIE 64** (r95) **INFOMAST** (d90) and **VIZASTAR** (d99). All these programs are capable of series disk-orientated business applications. **DIARY 64** (r43) is a really excellent 'single page' datafile for tape or disk records.

FINANCE/SPREADSHEETS

CALCRESULT (d110) is a very sophisticated 3D spreadsheet we highly recommend for serious business uses. **PRACTICALC** (d40 35) is very good value. Also: **FUTURE FINANCE** (d75) and **BUSICALC 2** (d79 77). For home accounts there's **BANK MANAGER** (d10 7.50) **HOUSEHOLD FINANCE** (21) **MONEY MANAGER** (9.99) **HOME ACCOUNTANT** (d52.50) **TIME & MONEY MANAGER** (d49). Business account programs are available also. These usually form part of a suite of related business programs. For a low cost example **BUSCOM-1, BUSCOM-2, BUSCOM-3** and **BUSCOM-4** is an interrelated series for monthly accounts, wages, retail accounts, and stock system respectively (all d21 19 — demonstration versions at d4.50 2.50 each).

RECREATIONAL

We can supply any of the popular games from established software houses and this includes an unbeatable selection of imported material. If there's a program for the 64 . . . we can usually provide it! Also available are a whole series of excellent war and strategy games: **KNIGHTS OF THE DESERT, COMBAT LEADER, EAGLES** (all d29 29) and others. Learning games for adults include **TYPING TUTOR** (d17.50 15.50) **GRAND MASTER** chess (17.50) and **SPEED READER** (d48). Remember, if you see a software review we can usually provide it! Look out for **ALICE IN WONDERLAND** (d27) and the definitive C64 **FLIGHT SIMULATOR II** (d35). Really goods imports include **PROTECTOR II** (d25 25) **FORT APOCALYPSE** (d23 23) **PITSTOP** (r27.50) **JUMPMAN** (d27.50 27.50) and **JUMPMAN JUNIOR** (r27.50) . . . but there are many others! Interested in adventuring? Highly recommended are the following: **COLOSSAL ADVENTURE, ADVENTURE QUEST, DUNGEON ADVENTURE, SNOWBALL, TIME LORDS,** and **TWIN KINGDOM VALLEY** (all 9.50) **THE HOBBIT** (14.50), plus Infocom's **ZORK I/II/III, STARCROSS** (all d29), **WITNESS, DEADLINE, SUSPENDED, ENCHANTER, INFIDEL, PLANETFALL** (all d36). No 64 is complete without **INTERNATIONAL FOOTBALL** (r9.99)!

Our list includes details of EDUCATIONAL, ACCOUNTING, BUSINESS and GAMES programs not possible to itemize here. PLEASE TRY US IF YOU ARE HAVING DIFFICULTY LOCATING A PROGRAM. Please make cheques/POs payable to the Six-Four Supplies Company.

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LETTERS PAGE

Price of inflation

CONGRATULATIONS on producing an entertaining, interesting and informative magazine.

One point which may be of interest to anyone having read Pete Gerrard's article on printers in issue 1. The Bytewriter daisywheel printer of which he spoke no longer seems to be available at a shade under £400. The price quoted to me by the Discom Trading Company was £485 plus VAT. A pity, as it takes it even further out of my price range, and it was just what I was looking for!

Peter Drobinski
Wimbledon
London

Rate of return

I WAS interested to read Market View on Commodore return rates (February issue). I wonder if my own case was typical? I purchased a 64 in November 83. Returning home I opened the box in great anticipation, and found everything worked — except every second letter on the third row of keys! I exchanged it for another, and this time the sound generator didn't work.

I exchanged it again, and this time voices 1 and 3 appeared to work, but not voice 2. By this time the dealer looked at me with some suspicion, but they agreed that it was faulty. They had to test five machines before finding one which appeared to work perfectly, but I must say it has since performed faultlessly, and is a joy to use. So I'm wondering what exactly the true rate of returns is.

Martin Nettle
Alford
Lincolnshire

Colour blind no more

I RECENTLY purchased a Vic 20, and have attempted to program in some of your listings. I have found that I'm unable to do so because I cannot find some of the special key symbols. Can you assist?

R Creed
Northold
Middlesex

WE'VE HAD dozens of letters and phone calls dealing with problems concerning the graphic command symbols. Just read Kevin Bergin's article elsewhere in this issue, and you should never be confused again!

Interfacing cassettes

WITH REFERENCE to Linda McColl's letter in February's issue, "Cassette Complaint", I know of a company selling cassette interface leads which are designed to allow the CBM 64 and Vic 20 to be used with standard tape recorders. The leads cost £12.95 and are available from L W Stanes & Company, Unit 2 Roding Trading Estate, London Road, Barking, Essex.

D F Price
Ebbw Vale
Gwent

THIS IS one of several letters pointing out that interfaces for standard cassette recorders are available. Other manufacturers include Swanley Electronics, 32 Goldsel Road, Swanley, Kent, and Datel Electronics, Hanley, Stoke-on-Trent. Tel. 0782-273815. If the current shortages of Commodore C2N datasettes continues we may review some of these interfaces.

Words of warning

CAUTION! Basic programs which call for M/C files to be loaded like this:

```
10 LOAD "M/C",1,1
20 REM . . . rest of program
```

will never work.

This is because having loaded the machine code, Basic re-runs the program from the beginning; that is it attempts to load the machine code again and again ad infinitum. One solution would be:

```
10 T = T + 1
20 IF T = 1 THEN LOAD
"M/C",1,1
30 REM . . . rest of
program.
```

Similarly a Basic program which LOADs another Basic program will be overwritten, but the new Basic program will autorun.

S P Rodgers
Camden
London

Going back

CONGRATULATIONS on a very good new magazine dedicated to Commodore users. I get tired of wading through the material on other computers which fills the other popular computing mags.

Unfortunately I didn't get your first issue (Dec/Jan) and can't find a back issue anywhere. Would any reader be kind enough to lend me a copy of the first issue for a few days — postage refunded. If so please contact me first on 0453-810451 (ext. 158) between 9am and 4pm.

L Mascall
Bristol
Avon

UNFORTUNATELY we're sold out of back copies of issue one. So can anyone help Mr Mascall? Other back copies are available from our subscription department, and photocopies of particular articles can be sent in exchange for an sae.

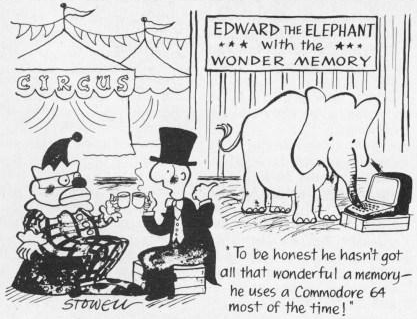
Hold on, there's more

IN OUR review of the SX-64 portable last month we missed out some of the software included in the price. Four packages, worth over £210 if bought separately, come with the machine: Future Finance (financial planning), Easy Script (word processing), Easy File (information handling) and High Flyer (a business simulation game). We also raised false hopes that the portable, which was available in the shops before Christmas, could be used with a television set.

Commodore says that 64 users can safely assume that their software will run on the portable — they only know of one exception, the Petspeed compiler. And there should be no problems with the modem either. As ever, we'd suggest that you see the software you fancy running on the portable before investing in either. The same goes for the modem.

Commodore adds that a tuning facility is not necessary but we still think that the signal being fed from any micro is unlikely to remain constant, so a tuner might come in handy.

Commodore also says that a lightweight keyboard and small monitor are part and parcel of a portable system. Again we think the keyboard doesn't match the 64's and that manufacturers may have misjudged the advantages of this style of built-in monitor.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"To be honest he hasn't got all that wonderful a memory— he uses a Commodore 64 most of the time!"
STOWELL

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NEWS DESK

Games follow-ups arrive

A NUMBER of the latest games available for the Vic 20 and CBM 64 are eagerly-awaited follow-ups to previous big successes.

Jeff Minter of Llamasoft has completed Hell Gate for the 8K expanded Vic. It's a fast paced arcade style game with 20 play levels and a challenging control action.

Hell Gate costs £6.00 on the Vic, and is also available for the 64 at £1.00 less.

While Hell Gate is keeping you occupied, Jeff is working on his next 64 epic, Sheep in Space, which should be available later in April.

Meanwhile, Virgin is aiming to follow up on the success of Steve Lee's Falcon Patrol with Hideous Bill and the Gi-Gants, for the 64. Like Quicksilva's Ant Attack for the Sinclair Spectrum, Hideous Bill features you as a fearless hero aiming to rescue the heroine from hordes of vicious ants. Hideous Bill costs £7.95 and is played with a joystick.

On the subject of heroes, Birmingham based Adventure International has announced a new series of graphic adventure games featuring well-known Marvel Comics superheroes.

The first, starring The Incredible Hulk, should be released on May 1st. Games featuring Captain America and Spiderman will come later. Each game will come with a comic which leaves the action at a crucial point, then it's up to you to play the game and save the day.

The games should be available for the 64 from an early stage, at a cost between £10 and £15. It's unlikely that they'll be available for the Vic.

Finally, Ferranti and Davenport Software has released what is claimed to be "the first real flight simulator for the unexpanded Vic 20". It's called Flight Zero One Five and costs £5.95.

Introducing the Valiant Turtle

FOLLOWING last month's article on Prism Technology's robot turtle Fred, Valiant Designs has announced the release of its own turtle to be used with the Commodore 64 and Commodore's version of the language Logo.

Like Fred, the Valiant turtle is controlled by an infra-red link from the CBM 64. In this case the range is around 20 feet.

The turtle has a pen holder, enabling the patterns designed in Logo to be reproduced in graphic form, on a sheet of paper.

The language Logo, which is particularly suitable for control of turtles due to its simple use of directional and movement commands, is becoming more popular for educational purposes. The Commodore version of the language has been written by Terrapin Software.

Valiant turtle — able to draw Logo-designed patterns.

The Valiant turtle, infra-red communicator and interface package will be priced at around £160. In line with Commodore's current policy of promoting educational sales, substantial discounts will be offered to educational institutions.

Details from Valiant Designs, Unit 14, Park House, 140 Battersea Park Road, London SW11.

More commands at your service

SOFTCHIP'S pick-it-yourself command cartridge service is to be extended to cover a whole new range of CBM 64 functions.

The unique service, from Whitby Computers, offers a list of over 100 new commands which can be used to augment the less-than-adequate Basic on the 64. You select the commands you want from a list which gives the number of bytes required for each command. Whitby Computers then places these commands on a cartridge with a maximum capacity of 8K, at a cost of £34.95.

Commodore's own Simon's Basic has been augmented by an extension package, which includes commands dealing with editing, trigonometrical functions, hi-res graphics and others. SBX costs £19.95 on cassette or disk.

The Softchip service has been available for the Pet for two years, and the original set of CBM 64 commands were based on these Pet originals. They covered areas such as editing, (MERGE, DELETE and so on), new Basic routines such as BORDER and TIME, and special business functions.

Now Whitby has developed a range of commands covering the 64's sound and graphics functions. David Tindale of Whitby Computers explained: "Although there are several companies offering good command routines on cassette, we are the only ones to make the users' own choice of commands available on cartridge.

"The new sound and graphics commands — which include a series of EFFECTs like gunshots, and DRAW and CIRCLE commands for graphics, will obviously make it easier to use the great potential of the 64. We also expect a lot of interest to be shown in our new series of disk commands."

"In the near future we're hoping to introduce some 3D routines, and features such as garbage collection (automatic sorting of alphabetical information) which was available on the Pet but is not on the 64."

For those of you who feel the selection of commands can be left to the experts, Whitby offers two cartridges at £30 — the Programmer's Friend, which is a form of toolkit, and Business Command, which is self-explanatory.

Simon's Basic has come in for some criticism over the way it has crammed 114 commands onto 8K.

David Tindale argued that, "Even if the Simons Basic Extension, which adds another 86 commands when used with Simon's Basic 1, eliminates some of the faults which have caused it to be criticised, we still think the choice offered by Softchip will make it the best way to improve the Basic offered on the 64."

Taking serious steps

SERIOUS software and hardware for the Commodore machines is making great strides forward, with a special offer to schools from Commodore and a selection of new business and education programs.

Commodore's plan is to make it economically viable for schools to invest in CBM systems, which were left out of the government's Micros in Schools campaign in favour of Sinclair and Acorn machines. The offer, which lasts until the end of April, consists of a CBM 64, 1541 disk drive, Logo language package and Simon's Basic 1 at a price of £299.99.

Meanwhile Chalksoft of Worcester is converting most of its educational programs for use on the 64, despite the problems in writing educational software for the 64, which centre around its inability to look at more than 16K of its 64K memory at once.

On the business side, Anagram Systems of Horsham has released a new Purchase Ledger for the 64, based on Commodore 8000 software. At £75, Purchase Ledger deals with invoicing, remittance advice notes, balances, statements and customers' names and addresses. There's also a Sales Ledger program on disk for £75.

Simple Software of Brighton has released Simply Assemble, for the 64 and Pet, to join the Simply Write and Simply File programs. The assembler features, among other functions, full screen editing and automatic conversion of the assembly listing into Basic. Simply Assemble costs £22 plus VAT on tape or disk.

Finally, Oxford Computer Systems has launched a range of three Integer Basic Compilers. One is for the 3000/4000/8000 series, one for the CBM 64 and one for the 700 business machine.

For further details, contact OCS at The Old Signal Box, Hensington Road, Woodstock, Oxford.

Rivals promise network choice

COMMODORE users will soon have access to a choice of two national networks. One is Commodore's own Compunet, the other Micronet 800, which has been around longer in the UK.

Databases operate through a mainframe computer, which is accessed from the home via ordinary telephone lines. The computer "talks" through a modem, which must be designed to be compatible with the particular computer.

Micronet 800, which already serves Spectrum, BBC, Apple and Pet users, is now developing a CBM 64 service for a Spring launch. Users will be able to download software (some free of charge and some at around 20% less than shop prices), send messages to other users, receive newsflashes and access Telecom's Prestel service.

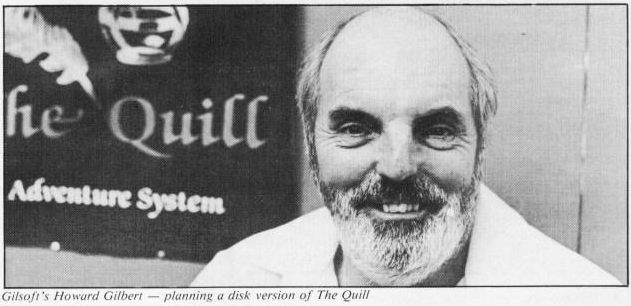
Subscription charges are £13 per quarter for Micronet and Prestel, with a 5p per minute charge at peak hours plus telephone charges. Modems cost £69.95 for the 1000 model, and £84.95 for the more software controllable 2000. Additional software will bring the price up to nearer the £100 mark.

Commodore's Compunet system operates at a similar baud rate — number of bytes transmitted or received per second — to Micronet, so operation charges should be about the same.

Commodore's modem for the 64 should cost around £100. Compunet is likely to be linked to other databases, such as The Source in America, and will offer facilities such as teleshopping and telesoftware. No subscription will be charged, although there will be fees for downloading certain programs and a connection charge between certain hours.

Contact Micronet at Telemap Ltd, Scriptor Court, 155 Farringdon Road, London (01-278 3143), and Commodore Compunet at 675 Ajax Avenue, Trading Estate, Slough, Berks (0753-74111).

Write your own adventures



Gilsoft's Howard Gilbert — planning a disk version of The Quill

ADVENTURE fans will welcome the arrival of a version of Gilsoft's The Quill for the CBM 64, at the end of April.

This unique program enables you to write complex adventure games with no knowledge of computer programming.

The original Sinclair Spectrum version of The Quill has been nominated in the software section of the annual Micro Computer Awards.

Howard Gilbert of Gilsoft explained that the CBM 64 version will be essentially the same program, although with minor differences in screen presentation. "At slightly more than the £14.95 cost of the Spectrum version, The Quill for the 64 still represents excellent value", Howard commented. "There will also be a version on disk at a slightly higher price, partly dependant on the kind of packaging and presentation we decide on."

The Quill is menu-driven, and comes with a complete 52-page manual. It allows you to map out locations and specify objects found in your own adventure, then input explanatory text.

Gilsoft encourages users of The Quill to market their programs, asking only that The Quill be credited. One successful adventure created using The Quill is Denis Through the Drinking Glass, which comes from Applications Software.

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Datapen sheds light

HAMPSHIRE-BASED Datapen Microtechnology has released a CBM 64 version of the successful Lightpen for the Vic 20.

The new lightpen comes complete with three introductory programs. The first is an explanation of the pen's functions, which includes a software listing which should enable you to incorporate the lightpen's functions into your own programs. Intro also includes a routine to move sprites around the screen.

The second program, Colour-Draw, allows the 64's colour graphics characters to be transferred from an on-screen menu to any required position using the lightpen.

The third program, Hi-Res Draw, uses the maximum resolution of the computer to produce line drawings. All drawings may be saved to tape and reloaded later.

The Datapen is British designed and features a data control switch and ambient lighting immunity. It costs £25.00 and is available through dealers or by mail from Datapen Microtechnology, Kingsclere Road, Overton, Hants, telephone 0256 770488.

Break into print

IF YOU WANT to take your first steps in computer journalism, or simply pass on your knowledge of Commodore micros, this is your chance. Just fill in this form and send it to *Commodore Horizons* — we'll try to get back to you as soon as possible to discuss your chosen subject areas in greater detail. Or simply send us a sample of your work (don't be shy) and we'll let you know what we think — for further information on submitting articles see page 3.

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CLUBNET

Step right up for Clubland

An introduction to the world of the Association of Computer Clubs by its chairman ***Rupert Steele***

ARE YOU a member of a computer club? Have you visited your local club? Do you know where your local computer club is? If the answer to all these questions is "NO", then you may be missing out on something which may breathe life and interest into your Commodore computer.

Computer clubs come in three varieties; there are National User Groups, local computer clubs and closed computer clubs. The national user groups are associations of users of a particular computer system, and they tend to operate largely by a postal newsletter system, since they are too widely dispersed to have meetings. Some of the national user groups are run on a commercial basis, with one or two people treating it as a full time occupation. Others are run by a much larger number of amateurs, using what time they can find.

Local

Another type is the "closed" computer club. This is the kind of club that is usually started at a place of work or a school, and caters exclusively for employees or pupils. Some such clubs do have an open affiliate membership (particularly the clubs attached to Colleges or Universities), but others do not. Such clubs work well in large organisations where people have free time in the vicinity of the normal premises, and I have had reports of clubs being formed among the British Troops in West Germany, and at various army bases. Other institutions which have brought forth computer clubs include banks and Government Departments.

The main type of club I'm writing about is the local computer club. This kind of club has membership open to all those in the area who are interested in personal computers. Some local clubs are specific to a certain machine, but many others are of general scope, so allowing members to gain from the cross-fertilisation of ideas, and to see a variety of computer systems in action when considering a purchase. So what goes on at a local computer club?

That rather depends on the type of club it is, but two activities are very common. They are speaker meetings or lectures, where an outside speaker or a member of the club gives a talk of perhaps an hour and workshop sessions where members mix informally and spend time in hands-on use of computers. Some of the large local clubs have machine specific sub groups for discussion of, say, Commodore related topics, with general meetings to discuss perhaps artificial intelligence or robotics. And many local clubs will run such things as communications workshops.

So what is the ACC's role in all this? The ACC is the national Association of Computer Clubs, which is the representative and liaison body for computer clubs across the country. It is controlled by the computer clubs which it represents, through a representative Council of club delegates. It is a non profit making organisation.

One of the areas in which ACC is active is in putting people in touch with their local clubs. The ACC maintains a clubs database and we can give people the details of their nearest clubs. But of course we can't do this if people don't tell us about their clubs, so if you run a club please write to the ACC and we will make sure it gets on the database.

The ACC is also active in the communications field. We run an area on PRESTEL called Club Spot 800 (part of the Micronet 800 database). Starting on page *8008*, you will find pages of news and views from around the Club Scene. And you can edit your own club's pages on club spot. Write to me for details of how you can edit on club spot — there are no charges apart from the phone bill!

Computer clubs — the answer to your prayers?

There is a club affiliation scheme, which allows clubs to affiliate to ACC for a nominal fee of six pounds per year (to cover our administrative expenses). Affiliated clubs are able to send a representative to ACC Council and can take part in Club Spot. We are also arranging an insurance scheme for affiliated clubs, so that they can be covered at a large discount on a standard policy. One of ACC's four working groups works on thinking of ways that clubs can, by pooling their resources, gain benefits all round. One example of this is the speakers list, which we hope to make available to affiliated clubs (in first edition) from April. If you would like to be on our speakers list (and to be invited to give talks at nearby clubs), please write to me.

National

The ACC is also involved with the National User Groups at computer shows and exhibitions. At the major shows, there is a feature often known as Clubs Avenue where the computer clubs exhibit on special stands. The allocation of these stands is handled by ACC, who are given the space by the exhibition organisers for the purpose. At recent exhibitions, many of the major national user groups have been represented, along with one or two major local clubs, the Association of London Computer Clubs (ALCC) and Club Spot 800 (the ACC Prestel area).

If you are running a local computer club, wanting to find a nearby computer club or thinking of starting your own computer club, then please write to me. The ACC has a 'Club Information Kit' available free which gives advice on setting up and running computer clubs, as well as the database enquiry service.

Please address any enquiry resulting from this article to: Rupert Steele, 17 Lawrie Park Crescent, LONDON, SE26 6HH or Tel: 01-778 6824, and I will pass it on to the correct officer. ■

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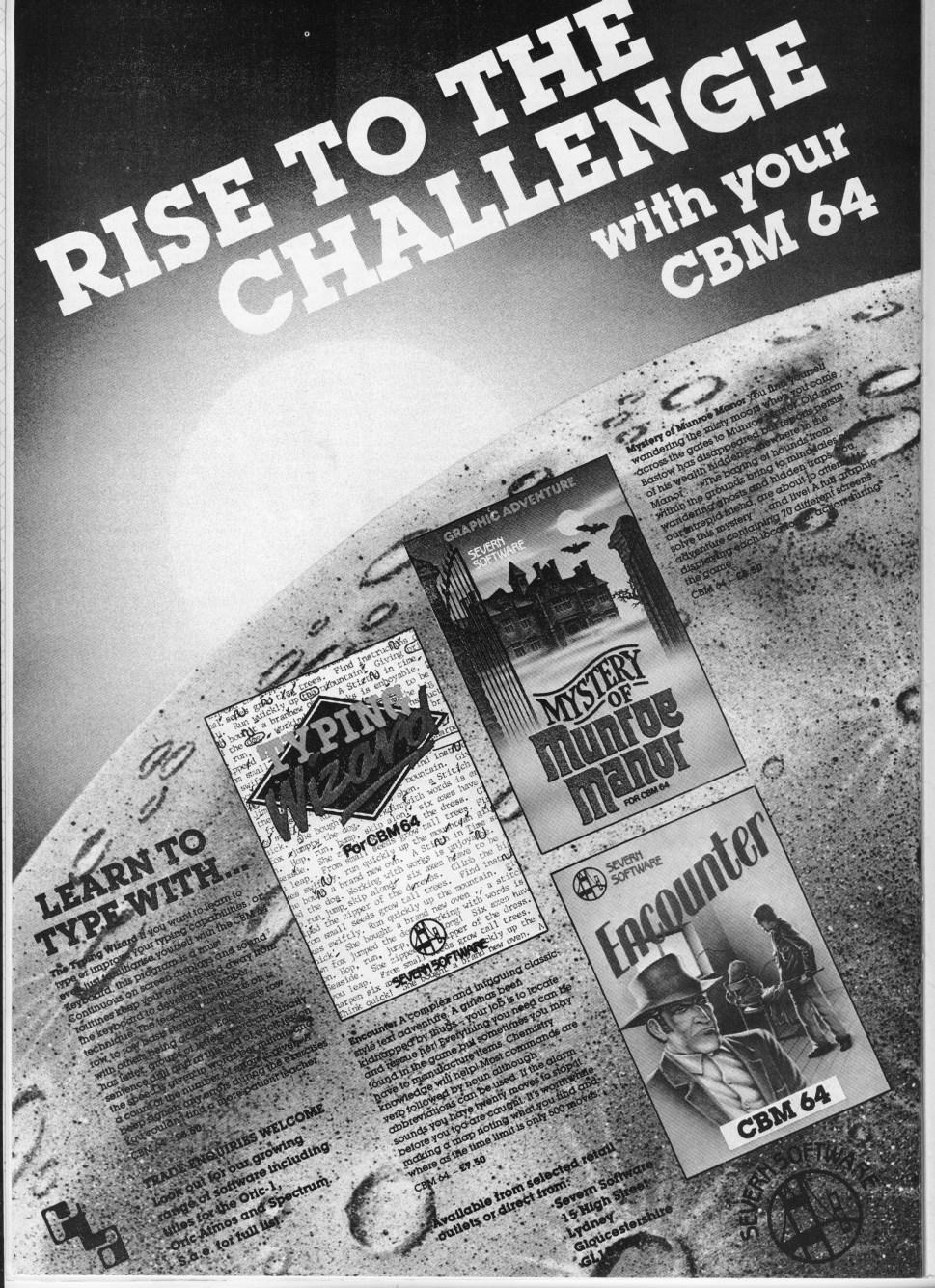
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On the ball

***Pete Gerrard** hits some losers and winners*

THE MAJORITY of the action this month is taking place on the Commodore 64, but to start off with something just a little different (and to keep Vic 20 owners from cancelling their subscriptions immediately), Galactic Software has leapt onto the latest bandwagon amongst software suppliers and produced a games designer, impressively called Games Designer, for the unexpanded Vic 20.

With this £9.50 program, so the blurb says, you need no programming experience to be able to create great games, and just to prove the point the cassette with the Games Designer on it comes complete with three sample games which were themselves created by using the facilities of the Games Designer program.

This appeared to be the logical place to start: see what sort of high quality, arcade action games could be created using the program and if the games were up to a suitable standard, then surely the program itself must be worth considering.

With this premise in mind, the first sample game was loaded into the Vic, and yes it did indeed run on the unexpanded machine.

However, Kanga, as it was engagingly called, proved to be as exciting as watching paint crack. You take on the role of a kangaroo, who has to fee the tiny roos by trundling down to the bottom of the screen and getting some food from your good friend Andy Ant.

Between you and the ant there pass a number of horses and wagons, and inevitably a certain kangaroo will meet with a dismal fate when trying to descend the screen.

The second sample program has you in charge of a spaceship, whose mission is to get some fuel by trundling down to the bottom of the screen.

Between you and the bottom of the screen there pass a number of space patrol ships, and inevitably a certain spaceship will meet with a dismal fate while trying to descend the screen.

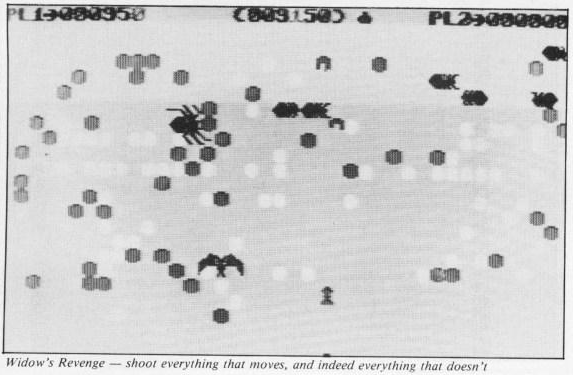
Are you beginning to get the drift? This program allows you to create one type of game only, namely the mad panic run across the screen, while trying to avoid various objects floating about the place.

A laudable attempt to produce a games designer for the unexpanded Vic 20, which does allow you to design characters, position them on the screen, create background music, and to a certain extent "personalise" the game, but there is a limit to how much you can achieve with an unexpanded Vic 20. Unfortunately, Galactic Software has reached that limit, and one can only hope that their Commodore 64 version of this program exploits the 64's greater potential.

Weak link of the month having been reached, the remaining programs are all for the Commodore 64, and without exception they are all GAMES!

You know, some people probably think that we reviewers have an easy life. Get some free games, play around with them for a while, and then write a load of drivel about them. This is, to an extent, very true. On the other hand, when you've seen one game of Centipede you've seen them all, and Widow's Revenge, one of the latest offerings from Bubble Bus software at £6.99, is yet another version.

Kick-off — an implementation of the old favourite Table Football



Widow's Revenge — shoot everything that moves, and indeed everything that doesn't

Artic

To quickly run through the rules of the game, for the benefit of all those of you who have spent the last three years on an Arctic expedition, in Centipede you are in charge of a garden.

You spend your time at the bottom of the garden (often referred to as the screen), and from there you must keep an eye on everything that happens above you. Whatever version of the game you happen to be playing, the essential ingredients remain the same. Nasty spiders bob up and down with the avowed intention of killing you off, mutant creatures trot across the screen to provide you with the occasional chance of a bonus score by wiping them out, and down the screen comes hordes of centipedes (or in this case, spiders).

The rest of the screen is full of little mushrooms, and as the spiders collide with the mushroom their direction of movement changes and they wander off in the opposite direction, having meanwhile stepped down a row on the screen.

You must avoid colliding with the spiders (either large or small), and simply have to shoot everything that moves, or indeed everything that doesn't.

There are better versions of Centipede around, and I can't really imagine why anyone should want to bring out, or buy, another.

Kick-off is a better game, however, as Bubble Bus have taken a logical step and decided to implement a version of the old favourite Table Football game. Version▶

Taking stock to make money

***Michael Watts** takes a look at two Commodore packages covering financial planning and stock control*

FINANCIAL PLANNING and stock control are two of the most common business applications. This review looks at two £75 Vicsoft packages providing these functions — Future Finance, written by Finsama, and Easy Stock, by Anagram Systems. So what do you get for your money?

The Easy Stock stock recording and control package is supplied by Vicsoft packaged in a solid cardboard box. In addition to a large, comprehensive and well written ring bound manual the box contains two heavily protected disks, one of which should be locked away somewhere safe for back-up in case of accidents to the working disk.

The minimum equipment required comprises a single 1541 disk drive and supply of diskettes, a CBM 64 and a screen (TV or monitor), and a serial printer which must be from the Commodore range (1515, 1525 or 1526). No provision appears to have been made for a dual disk drive set-up but, in fairness, for the size of business at which this package is aimed dual drives are probably unnecessary.

Mention is made in the manual of the facility to use an ASCII printer but *no* instructions are given for connection to the user port. Commodore tells me that this is indeed possible but I was unable to make any of the three Centronics printers that I tried work. If this is important to you my advice would be to check with Vicsoft that your particular printer will be satisfactory. Vicsoft has always been very helpful to me in my many strange requests and I am sure it will do its best to sort out any problems.

Vital

In my view a printer is really vital for the production of stock reports and analysis — continually scanning backwards and forwards through the stock Item Index, while possible, is hardly likely to be practical.

Where stock is below the previously determined minimum the "In Stock" field is highlighted, in reverse colours. Where the number of stock items is low it is a relatively easy matter to scan the individual records on screen but the automatic report facility which provides output to the printer is obviously of more use.

Easy Stock provides facilities to record and analyse up to 550 items on each disk with no limit to the number of data disks other than in practical terms. A comprehensive system for monitoring stock levels produces a full range of reports and includes a warning report when any stock items fall below a predefined level.

The program is easy to use with comprehensive Help screens provided throughout, accessed with the Back Arrow key on the top left hand end of the 64's keyboard. The useful user manual has a good section on transferring from a manual system of stock recording to computerisation. Divided into sections, it also contains a brief introduction, an easy to use tutorial and a comprehensive reference section.

Good use has been made of the Commodore function keys:

F1 Display previous screen.
F2 Display next screen.
F3 Requests update function — updates a file.
F8 Return to previous screen or function — using the F8 key several times will allow you to escape to the main menu.
Left arrow key — help.
Run/Stop key terminates current function or closes down system.

Loading the program from diskette takes about 1 minute 50 seconds after which the Easy Stock title page is displayed. Remember, however, that if this is the first time you have used the program, you will need to have previously prepared an appropriate quantity of data diskettes. As the File Club program takes nearly 20 minutes to format and set up each disk you would be well advised to spend this time reading through the User Guide. Provisions are made in the File Create program to detect and allow you to replace a faulty disk. When the file creation is complete you are offered the option of creating another data file or chaining Easy Stock.

More effective use has been made of the colour facilities offered by the 64 than with some similar programs, which helps to make Easy Stock pleasant to use. The amount of planning put into a program of this quality is evident in the way in which the date field is filled automatically (after the date is entered on the Start of Period or Start of Day screens). Careful formatting of the many input fields makes an incorrect entry much less likely and eases the operator's job.

While Easy Stock doesn't raise orders for you it does flag stock items which are below a previously determined minimum level; it also allows you to record how many of each particualr item you have on order.

Stock items are accessed throughout by a stock number which is used by the program to set up the Stock Index from which you will gain access to each of your individual stock records. In this respect a great deal of forethought is needed on the part of the potential user in that the Stock Number should be allocated in a way that makes finding a particular item as simple as possible. Some thought should be given to the possible use of mnemonics or abbreviations, up to 10 alpha-numerical characters are allowed, and stock should, where possible, be grouped in a logical way. Suitable spaces should be left in the Stock Number Index so that items can conveniently be added at a later date.

From the point of view of the small businessman, which I have been for the

Main Menu
1 Profit Menu
2 Cash Menu
3 Filer Menu
4 Report Menu
5 Cancel Data (in Memory)

Report Menu
1 Print Sales Totals
2 Print Purchase Totals
3 Print Expense Totals
0 Main Menu

Profit Menu
1 Sales Titles & Tax
2 Sales Prices & Costs
3 Sales
4 Costs
5 Gross Profit
6 Expense Titles & Tax
7 Expenses
8 Net Profit
0 Main Menu

Cashflow Menu
1 Sales Credit Periods
2 Purchase Titles & Tax
4 Purchases
5 Expenses
6 Tax Report
7 Cashflow Report
0 Main Menu

Filer Menu
1 File a Model
2 Retrieve a Model
3 Delete a Model
4 Directory
5 Format a Data Disk
6 Call Consolidator
0 Main Menu

Consolidator Menu
1 Retrieve a Model
2 Consolidate a Model
3 File a Consolidated Model
4 Delete a Model
5 Directory
6 Consolidator Report Menu
7 Format a Data Disk
8 Call Future Finance

Consolidator Report Menu
(called separately from disk)
1 Net Profit Report
2 Tax Report
3 Cashflow Report
0 Consolidator Menu

past 10 years, I feel that this is an extremely useful program. While it certainly does not offer all the facilities of some of the more expensive packages on the market I am sure that, for the price, Easy Stock will be hard to beat.

As ever when assessing the relative merits of a variety of business software it is vital that the potential user is able to compare the package of his choice with his existing system. I would strongly recommend that potential buyers set aside time to check this, or any other package, against their existing system bearing in mind the time, effort and potential disruption that changing over to a computerised system could possibly entail.

Future Finance also comes in a substantial cardboard package containing the comprehensive and well written manual and two protected program disks (one for back-up).

The program runs on the 64 and requires at least one 1541 disk drive and a monitor or TV. A printer, if used, must be from the Commodore range, ie 1515, 1525 or 1526, as the program does not support printers connected through the CBM user port. While not essential, in the planning sense, some kind of hard copy output will almost certainly be required at some time.

Before considering the benefits to be gained from a program like Future Finance it may be as well for me to explain briefly the purpose of a financial planning system.

Financial planning is, in our case, the art of creating a model of the financial structure of a business: what it sells, when, how much it costs to make these sales both in terms of cost price and overheads, the cost of running the business (administration) and so on. Having created the model it is a relatively simple, though, at times, somewhat inaccurate, task to forecast the financial structure of the business for a certain period. Obviously the further ahead one tries to look the less reliable become the forecasts.

Modelling

Future Finance is a comprehensive, easily followed program, designed to make the setting up of such a financial model a simple task even for someone who has never attempted, nor even considered, such a thing. Unfortunately, because of the way in which the program has been designed, to be ultra user friendly, it suffers from severe limitations in the size of business that it will support. Each disk holds a maximum of nine models and each model permits only 15 sales items (product lines) with their related material costs, and 30 expense items — rates, wages, power, phone etc. The consolidation of two or more models is provided for but still only allows a maximum of 120 product lines spread over eight separate models.

The entire system is menu driven. Use of the menus involves the selection of the appropriate option by number — followed, in my view unnecessarily, by a Return. I much prefer to be taken straight into my selected option without extraneous key depressions — the use of the Return key is obviously to allow for correction of wrong inputs by the Del key — in this program even the function keys need a Return after them before they have effect.

Loading from disk is straightforward, if somewhat long-winded taking about one and a half minutes. Little use has been made of the Commodore's colour facilities, which is a pity as judicious splashes of colour would certainly make for a little variety in what is, after all, a fairly dry subject.

The accompanying diagram shows the various menu options, and the way in which the menus are linked together should give some idea of the scope of Future Finance.

Statistics

From the Main Menu screen the first decision to be made has to do with the selection of an accounting period. Future Finance permits three options, 12 calendar months, 13 lunar months or 13 weeks (one quarter). For the newcomer the Future Finance User Guide provides an extremely well written introduction to the subject with a comprehensive tutorial which should take 2-3 hours to work through and will fully explain the facilities on offer.

The package provides facilities for the analysis and subsequent print-out of:

Sales — by description, quantity, value and cost.
Costs — (of sales) by description, quantity, value and cost.
Gross Profit.
Expenses — by description (makes allowance for tax).
Net Profit.
Cashflow — with allowance being made for sales credit periods, purchase payments, expenses, etc.

Full disk handling is catered for with the Filter Menu which takes care of Formatting data disks, Filing, Retrieving and Deleting Models and so on.

As mentioned earlier the facility (provided by the Consolidation Menu) of merging the totals from two or more models is extremely powerful and useful. By setting up four quarterly models it is quite practical to build up a weekly overview of the financial outlook of the company for the coming year. The Consolidation facility also permits the establishment of models for several separate elements in a business, different departments, sales areas and so on, which can then be merged to give a general overview.

In my view, providing the limitation mentioned above is not an important factor, Future Finance is an extremely well written, comprehensive package which is considerably cheaper than the majority of business oriented software. This program must be worthy of serious consideration by the small businessman who has not previously considered financial planning on a computer, with all that the concept implies.■

◀on a theme it may be, but it's nonetheless an excellent game.

Or, it would be if I could play it. Here we have to rely on other authorities, namely everyone I've ever played a game with who has beaten me at it. The real thing maybe, but on a computer . . .!

The table is laid out in the traditional manner, with each player having control over four bars of players, otherwise known as rods. These consist of one goalkeeper, two defenders, five midfield players and three forwards. The packed midfield that results from this particular layout can end up in some dour fourth division struggles, but that's what Bubble Bus (and the makers of the real thing) insist upon, so you'll just have to bear with it.

Control of the game is via two joysticks or one joystick and keyboard, and moving the joystick left or right will swop control from one rod to another. Moving up and down will similarly send the appropriate rod moving up and down, and pressing the fire button as well will either rotate the rod (and thus, hopefully, kick the ball), or put the men upright, depending on which way the joystick is going at the time.

Four goals constitute half time, and everyone then swops sides for another four goals, at which point the game is over.

I found this game difficult to control, although others tell me that they found it easy enough to get on with. It may no longer be possible to do the famed push and pull shots that we all remember from playing the real thing, but if you want a table football game on your office desk, or even if you just want a few laughs, this latest offering from Bubble Bus at £6.99 is the answer to your problems.

Fishy

Neptune's Daughters, a fishy little game from the proudly named English Software Company, was almost the winner of this month's "Game of the Month" competition. Not quite, as we shall see later on, but in terms of originality, use of graphics and sound, and ease of play, it almost stole the show.

It's certainly a lot better than most of the rubbish that comes out for the 64 these days, and the only people who won't like this game are those who would object to seeing a naked lady shown vaguely, and fleetingly, on the screen. However, you have to get through four levels before you'll ever see her, and even when you do find her she insists on rushing off home to Neptune's Palace, so not even Mrs. Whitehouse should find anything to complain about here.

In this game you take on the role of a deep-sea diver, described in the promotional literature as an intrepid aquaman, capable of breathing through the gills in the side of his neck.

You just happen to be around these parts, when news comes through of the evil sea serpent who, tired of a diet of sea horses and chips, has taken to stealing Neptune's daughters and hiding them in his lair.▶

LLAMASOFT NEWS

NEW for the 8K Expanded VIC:

HELL GATE

A very fast-paced Arcade game featuring simultaneous control of 4 high-speed laser cannon. Unique game action is easy to learn yet difficult to master. Features include 20 levels to challenge you; automatic Smart bombs; seven-place High Score table with score signature memory feature and full Attract mode. A superb Jeff Minter design presented immaculately on a 25 x 30 screen.

£6.00

COMMODORE 64: After finishing HELL GATE Jeff took a couple of days to pop the code onto the '64. Whilst this is no Revenge or Hover Bovver, we are offering HELL GATE 64 at the bargain price of £5.00... an interesting diversion to occupy a little time while you wait for Jeff's next '64 epic, which we can now reveal will be called

SHEEP IN SPACE — for which Jeff promises the usual great graphics and sound — and also a totally new control concept... so prepare to feel extremely sheepish in a few month's time.

Until then — to all our followers

A) HAPPY BLASTING/MOWING/SPITTING ETC.

B) DON'T SHOOT THOSE GOATS!!!

BY JEFF MINTER FROM LLAMASOFT

Jeff

Minter

LLAMASOFT

AWESOME GAMES SOFTWARE

49 MOUNT PLEASANT, TADLEY, BASINGSTOKE, HANTS.

◀Being an intrepid aquaman who also probably fancies his chances with said daughters, you go off in search of paradise . . . sorry, wrong program . . . in search of the stolen daughters of Neptune.

On the way you'll have to fight off hordes of angry octopi with your trusty harpoons, avoid bumping into the coral-ridden walls, destroy the amoeba swarms, kill the deadly sucker plants, and finally stab the ferocious giant crabs and feed them to the evil sea serpent before he consents to let the stolen daughters go.

After that, the levels get harder, with more octopi, amoeba swarms, etc., and your time limit before you run out of oxygen appears to creep up on you a whole lot faster.

Breathing

A great game, highly enjoyable, but there has to be a complaint I'm afraid. When entering your name into the Neptune Daughter's Hall of Fame, the joystick has to be moved to position the cursor over the correct letter, and then the fire button pressed. All you have to do is breathe on the fire button, and three or four letters will instantly appear. Slow down the repeat rate, and this game would be just about perfect. Neptune's Daughters costs £9.95.

From the same English Software Company, Marathon is one for the tinies amongst us, or those who get totally embarrassed in the local pub when asked to add up the darts scores, because this is a test of your mental arithmetic.

A two player game, again at £9.95, the Marathon part of it comes in because both players are in control of a little man at the top of the screen, and depending on whether or not your answer to the particular question being set is correct, your little man trots along the screen a little. After answering a number of questions correctly he'll have run far enough to win the Marathon, and the game is then over.

There are four types of race built into the game, ranging from walker to olympian, and each of these four types has five different skill levels associated with it. The different skill levels basically determine what it is that you'll be tested on, be it mathematics, division, addition or subtraction, and also how long you have to answer any question.

Also on the screen are two boxes, which, when a question is set, display a variety of numbers. One of those numbers will be the correct answer to the question, and by moving the joystick you have to position your cursor over the correct answer, and thus make your little man move along a bit.

The game goes on until someone romps home, at which point you can change the level and/or type of questions asked, and to keep the kids happy they're given an appropriate comment about their performance.

Definitely one for those of us keen on improving our mental arithmetic, and whether you're aged from 6 to 66 (but probably not 14 to 24), you should find this program both fun, and useful.

One of Romik's latest offerings for the 64, Pottit, at £6.95, was the clear winner on the day, and the star of all the games that have been reviewed here.

This, I hasten to add, is not just my opinion. My resident 'assistants' in matters of games-playing on various machines, Shane and David, also regarded this at the best game of the bunch. Not only for addictiveness and originality, but also because this is one of the funniest games that I have seen in a long, long time.

The drawing on the cover of the cassette is probably misleading, since it depicts a snooker table showing just three balls, one white, one black, and one red. From this you may be forgiven in thinking that Pottit is some kind of billiards game, requiring skills and dexterity. To a certain extent this is true, but the amount of skill and dexterity required is virtually zero, since this is as similar to billiards as methylated spirits is to a pint of bitter. They may share a common base, but after that all similarity ends.

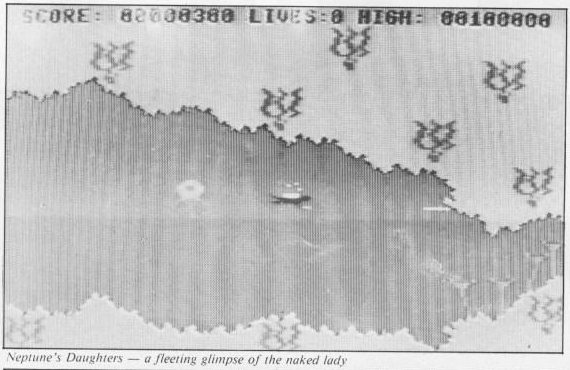
Manic

Each player has control over one of the balls on the table, either the black one or the white one. Using the joystick, this ball can be moved in any direction, and the movement of the balls has been worked out to perfection, including the gentle 'clunk' as they collide with each other or the cushions.

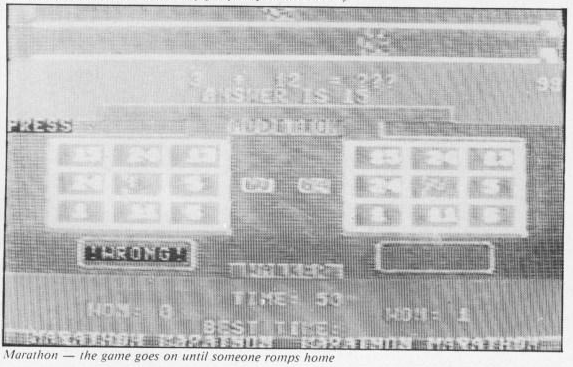
The aim of the game is to knock the red ball down a pocket, cannon off your opponent's ball into the red, or pocket your opponent's ball. If this was all there was to the game, it would be good enough, owing to the very realistic movement of everything on the table.

However, players soon discover that there is a new manic element to this game which is not often found in the genteel world of billiards. Repeated movement of the joystick sends the ball whizzing about the table at absolutely ludicrous speeds, and the subsequent collisions are enough to make even Alex Higgins blush.

A great game, and a great blow to those who say that you can't write good games in Basic any more. You can, and Pottit proves it. A simple, but highly effective, piece of programming, that is as addictive as anything I've seen for the Commodore 64.■



Neptune's Daughters — a fleeting glimpse of the naked lady



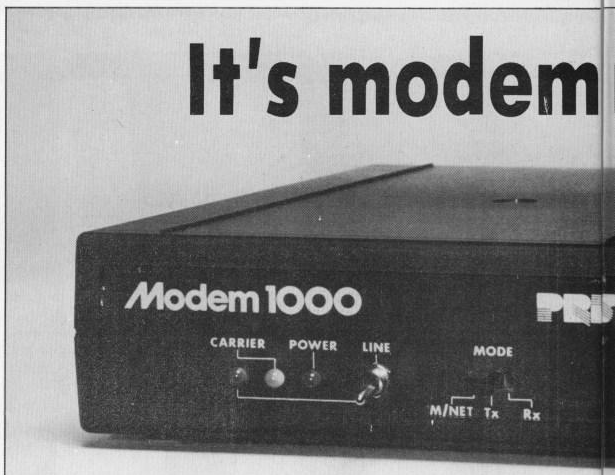
Marathon — the game goes on until someone romps home

VALH

ALLA

MOVi SOFT

It's modem



A dull-looking box, but full of tricks as

INSPIRED BY the well-known blues song, "I got my modem working", a number of modems have appeared for Commodore machines over the years, and the latest one of them all, for the Commodore 64, is generating as much interest outside of the company as it is inside.

It's the most interesting piece of communications equipment to come out of Commodore since, well, the last modem it produced. And that, at least in the UK, was a good few years ago. Modems of all kinds exist in the States, but the chances of getting them to work in this country are remote. This latest piece of hardware, and the possible Compunet service that Commodore is supposed to be providing in the next few months, does warrant a renewed look at these beasts.

But first, for our less technically minded readers, what exactly is a modem? It's little more than a box that sits between the computer and an ordinary telephone. Connected up (in the case of the 64) by the cartridge slot, the hand set of the telephone is then plugged into the side of the box.

Merrily

On receipt of an appropriate signal from the other end of the line (which could be from another 64, a remote mainframe computer, a typesetting machine, or indeed anything with a little bit of micro-technology inside it), the 64 merrily jumps into action and starts sending information down the phone.

This information could consist of many things. It could be a program file, it could be a sequential file, it could be a screenful of data, or it could be just about anything that the computer at the other end is capable of receiving.

One of the many interesting uses of modems lately can be seen in certain enlightened typesetting offices. Here the typesetting machine, usually operated manually, is simply plugged into the nearest modem and telephone, while at the other end of the line, a word processor (such as you might use with the Commodore 64) starts printing out information.

However, instead of printing that information out onto paper, it sends it down the line to the typesetting machine. With the aid of just a few codes embedded into the text, certainly using nothing more complicated than the codes needed to operate the word processor in the first place, the entire piece of text gets typeset in a fraction of the time (and cost) that it would normally take.

This is but one use of an extremely useful piece of modern technology.

The term modem itself comes from two words, MOdulator and DEModulator, and combining the two gives us our term. In its most simple form, a modem operates in the following way: pulses are modulated onto a carrier and sent to the receiving modem, where they are demodulated and sent to the receiving equipment. Uh? The pulse goes to modem A and gets modulated (ie changed so that it can go down the telephone line). After a quick journey down the phone it is picked up by the modem at the other end and demodulated (ie changed again so that the computer, or whatever, at that end can understand the signal coming in).

Modems can communicate at a variety of different speeds, and in a variety of different ways. The speed of communication is measured in terms of the baud rate, which is usually taken to mean the speed at which readers of this article will get fed up.

In computer terms, it relates to bits per second, so that a baud rate of 300 bits will be the equivalent of sending 300 bits of information per second down the phone. Since (in Commodore's world) there are 8 bits to a byte, this is the same as sending 300/8 or 37½ characters per second down the line.

Given that one or two characters are used as checking signals to make sure nothing gets chewed up by the phone, 300 baud will usually average out to about 36 characters per second.

The other terms you'll commonly come across when people start talking about modems are the phrases full duplex and half duplex. These both relate to the way in which information is passed from one computer to another down the line. Full duplex allows both computers to talk to each other simultaneously, while half duplex is, as you might imagine, a one way communication. If only certain humans could be programmed to operate on half duplex.

For some reason everything seems to have happened a lot faster in the States than it has ever happened over here, and such things as Bulletin Boards (which we'll come to in a moment) have been up and running "across the pond" for many years now.

However, we in the UK showed our traditional reserve in such matters, and nothing much happened until the early '80s, at least in the Commodore world. Then a certain Mr Nick Green (at the time Commodore's special projects manager I believe), and Messrs Bolley and Parkinson of Ariadne Software sprung something called Petnet onto an unsuspecting and uninformed world.

Host

Petnet was to be Commodore's own little Prestel service for users of Commodore machines. It would provide the facility to use a mainframe computer as a host machine, which would be capable of storing a lot of information about a wide variety of different subjects. This information could then be accessed over the phone by Commodore users everywhere, for little more than the cost of the telephone call.

You could leave messages for other users, state how long those messages were to remain on the system, and read messages left by other people. You could download softare from the host computer to your own Commodore Pet — that is, transfer programs from that computer to your own. Most of that was to be free.

At the time I wrote "Petnet is growing all the time . . . it is expected to expand fairly rapidly". That was the last time I ever believed a press release, because Petnet unfortunately died a horrible death.

n magic

as **Pete Gerrard** *reveals*

The system was quite simply never fully implemented, and amidst the rumours and backbiting that went on, it was all quietly forgotten about. The idea of another Petnet is floated again every once in a while, only to sink once more, and the chances of Petnet ever getting properly off the ground are about as likely as those of the Conservative party voting Neil Kinnock as their leader.

But while Commodore simmered and spluttered, others were being a little bit more active. In the early part of 1982 a little something called Micronet began to make itself heard.

Micronet, when it first started, was promoting itself as a "magazine on the air". Pretty much the same sort of thing as Petnet was once designed to be, but this time covering all leading makes of micros. They haven't yet got around to implementing a system for Commodore 64 owners, but one is said to be on its way.

Micronet is basically a computerised Prestel, although the service now extends as far as television shopping, giving you weather forecasts, and so on.

To link up to Micronet 800 is not cheap: it costs about £100 to acquire your modem plus software for most of the computers that the system is currently running for, and even after having paid that you'll still probably have to wait a little while to get all the passwords and phone numbers to dial before you can actually log onto the service.

Once you have logged on you'll find that there isn't much to choose between Micronet 800 and Prestel, one being merely a sub-division of the other.

It may well be worth waiting, if you own a Commodore 64, for the UK implementation of Compunet, Commodore's latest brainchild for the 64. To find out what Compunet is, let's briefly leap across the Atlantic and take a look at the States.

In America, Commodore has something called the Commodore Information Network, or at least that's what it was called when I read about it. This, like Petnet of old, is linked up to a host computer, and provides lots of information about Commodore products, news, conferences, user group information, and so on. In this case, the Commodore Information Network is itself part of a much larger service called Compuserve (why are there no original names anymore?).

Compuserve is a national computer network, and using the CIN you can gain access to various parts of this, for the interchange of Commodore-related information. You can, in theory, ask Commodore itself questions using this network, by up-loading your question from your computer via the modem and the phone to the national computer, and then waiting for Commodore to provide the answer for you.

I'd suggest you don't leave your phone off the hook waiting for a reply. It takes at least two days for any sort of answer to appear (Compuserve's rules, not Commodore's), and on top of that you have whatever delay Commodore itself builds in.

Nevertheless, the CIN was seen as a "good thing" by the powers that be, and it was decided that a UK implementation was necessary, incorporating all the features of the American version.

Sweet

However, since there is no real equivalent of Compuserve over here, Commodore has gone its own sweet way, and via the services of a friendly DEC10 computer living down near Heathrow, a prototype CIN is shortly to go into action. When (if) it finally gets off the ground it will be called Compunet (good grief), although apparently it is currently working under the pseudonym of the Commodore Information Tree — presumably because it's intended to have branches everywhere?

The Tree part refers to the way in which data is accessed from the host computer, since it operates in a branching procedure. That is, choose your topic, follow that line until it branches, choose your route then, and so on, until you finally get to the subject you were after in the first place.

Once they've finished all their testing of Compunet, which involves giving the national Independent Commodore Product Users Group bods a modem (join your local committee now: a modem to play with), it is expected to cost something in the region of £30 a year to log onto Compunet, plus the "sub-£80" cost of the modem itself.

This modem, so they tell me, will be operating at around 1,275 baud, which seems rather fast for Commodore. I'm also assured that there is full error checking on all transmissions, and if an error is found everything is re-transmitted until it gets it right. Of course, your phone bill soars through the roof, but at least you'll know that the message you sent down the line to your Auntie Maud telling her to put the chips on will have got through perfectly.

The modems to be supplied by Commodore are unique, in that they are also acting as a dongle for any software that you download from the system. Dongles, security keys, donkeys, whatever you want to call them, are just devices that plug into the computer and without which various programs will not run.

Dongle

For instance, it is intended that, like Micronet 800, there will be a fair amount of public domain (read free!) software available for users to download. Once you've got fed up with that, there will also be a fair amount of expensive software, which you can also download and be charged for. Here Micronet and Compunet part company, since Micronet software can be ripped off by anyone with a bare minimum of computer knowledge, but the Commodore software requires, yes, the dongle, to be plugged in before it will work again. Reasonable enough, we've all got royalties to earn, spouses to feed, etc.

Other differences between Compunet and Micronet include the system of billing, since Compunet merely charges you an annual subscription, whereas Micronet pays Prestel, who pays British Telecom, who pays the Government, who still takes the tax, and by the time you've paid the 20 or so middlemen for the privilege of paying each other, the costs mount up.

Apart from your subscription, the main charge will be that of using the telephone when the modem is hooked up, but even here Commodore would appear to be doing us all a service. The host computer may well live at Heathrow, but if the number of users warrant it there will be more computers installed around the country, each one in turn linked into the main one. Thus you only pay for a local call each time, rather than long distance from out in Inverness to Heathrow, or wherever.

Of course, Commodore will take its small percentage, but we'll keep quiet about that. They're in business too, you know.

If Compunet doesn't go the way of Petnet, it looks like it might be a major contribution to, if not road safety, Commodore's continued growth in the UK.

Computer mailing, and computer shopping, are both hoped to be added to the system as time goes by, and if enough of us get our modems working Compunet could well develop into something that's useful, rather than yet another thing for Commodore to have meetings about.

And all for the cost of a modem, a phone call, and an annual subscription. Give it time, ET, give it time. ■

SUNSHINE

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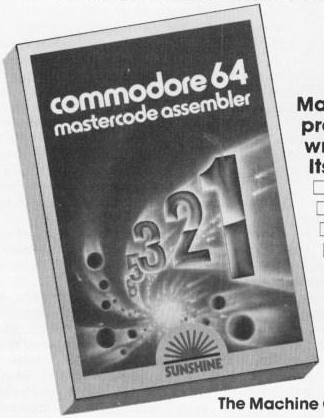
for the Commodore 64

Full Commodore 64 Assembler/Disassembler



£14.95 inc VAT

Mastercode is a substantial and complex program of use to anyone interested in writing machine code on the Commodore 64. Its features include:

- ☐ Machinecode monitor
- ☐ File Editor
- ☐ Disassembler
- ☐ Assembler

Mastercode is a full two pass assembler. It accepts labels, variables and equations within assembly language programs. It is possible to store programs anywhere in memory, even in parts occupied by the Assembler. Programs can be saved to either tape or disc.

The Machine Code Monitor includes:

■ OUTPUT OF MEMORY TO SCREEN OR PRINTER ■ MODIFICATION OF MEMORY ■ EXECUTION OF MACHINE CODE PROGRAMS ■ SAVING OF MACHINE CODE FILES ON TO TAPE OR DISC ■ LOADING OF MACHINE CODE FILES FROM TAPE OR DISC ■ STEP BY STEP TRACING OF THE EXECUTION OF A MACHINE CODE PROGRAM, INCLUDING DISPLAY OF REGISTER CONTENTS.

The Disassembler will translate into assembly language the contents of any area of memory, whether the 64's ROM or a user program. Output may be sent either to the screen or a printer.

The File Editor includes:

■ ENTRY OF NUMBERED LINES OF ASSEMBLY LANGUAGE INSTRUCTIONS ■ LISTING, INDIVIDUALLY OR IN BLOCKS, OF PREVIOUSLY ENTERED LINES ■ DELETION, INDIVIDUALLY OR IN BLOCKS, OF EXISTING LINES ■ RENUMBERING OF EXISTING LINES ■ SAVING OF ASSEMBLY LANGUAGE FILES TO TAPE OR DISC ■ LOADING OF ASSEMBLY LANGUAGE FILES FROM TAPE OR DISC ■ ADDITION OF A BLOCK OF MEMORY SPECIFIED BY THE USER TO THE USER'S ASSEMBLY PROGRAM

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PROFILE

Weighing software in the balance

***Christopher Jenkins** meets Commodore program evaluator Martin Croucher — and finds that there's more to the job than fun and games*

Martin Croucher at work...

IF YOU were given a pile of computer games with no instructions, and told to play them and make comments on each game, could you cope? And could you set a new high score on one of the games? And would you want to take a job doing that sort of thing day after day?

Martin Croucher faced this fearsome test and emerged triumphant, and now works as a software evaluator for Commodore UK. "My actual job title", Martin explained, "is recreational software specialist — but when I applied for a job with Commodore I hadn't any idea what I'd end up doing, and neither did they! There wasn't anyone doing that sort of job at the time, so to some extent the job has defined itself as it goes along."

Interview

After four years working as a laboratory technician in the field of photographic materials, Martin's interest was aroused when a friend who had become a programmer at Commodore told him that there were vacancies at the UK headquarters. "I didn't have any real technical or programming knowledge", Martin recalled, "but when I went for interview in October last year I had owned a Commodore 64 for about two months. I wanted to teach myself something about programming, and I sometimes used it to play games, but most of the computer know-how I've picked up has been from associating with the real experts at Commodore."

Martin's unusual interview started with two hours of straightforward questioning, then developed into a mammoth games playing session. "They just gave me a pile of games without instructions and told me to play them and evaluate them. I was amazed at how well I managed to do — in fact I even set a new record score for one of the games! One of the ones that defeated me was the new International Soccer cartridge — what I wasn't told was that it had been set on Level 9, which is almost impossible to beat. Still, the result was 3-1 so it wasn't that bad!"

Martin's early ideas, that the only jobs in computing were for programmers or VDU operators, turned out to be inaccurate. "Often you find that too much technical knowledge is a burden. Although I now know enough to POKE a new screen colour or format a disk, it's always a good idea to approach a new game with the minimum of technical knowledge — after all, what matters to the customer is how well the game plays, not how brilliantly it's programmed."

Programs

Martin's basic role is to examine unsolicited programs submitted to Commodore, and work to develop the suitable few to a marketable level. "I see a huge range of programs and it's my job to submit reports on them to the software products group committee. They often fall into familiar categories — I see lots of well-written programs which are unmarketable because they're not at all original. Normally, it's true that we would ▶

◀ be more interested in something which is an original idea, on which we can work with the author to get the program up to marketable standard. On the other hand, we sometimes contact software houses producing programs for other machines, and encourage them to produce Commodore versions."

Evaluation

The standard evaluation report covers just about every aspect of a program anyone could imagine. There are sections for user friendliness, speed of operation, use of the relevant computer's features, screen format, quality of the instructions provided, and so on.

"On the back of the report I write suggestions as to how I think the program could be improved," Martin continued. "At this stage I talk to the programmers about whether the ideas I have would be practical. Every fortnight we have a meeting of the software review committee, with the products manager, the sales manager, and so on, all looking at the program and discussing its possibilities. On average I have about ten programs submitted to me every week, and every one is looked at, though of course only a small percentage of them are suitable for development."

Martin went on to give a number of examples of the programs currently being considered. "One arcade-style game set in a garden had a good basis — it was all to do with watering flowers and clearing weeds. But there wasn't much variation, and only one level of play, so I suggested that perhaps on the second stage the watering can could be leaky, and that there should be a total of about five different stages. That idea would go to the review committee, then we'd get on to the author and suggest that he rewrite the program in that way, with our in-house programmers lending advice if necessary. Most of their work consists of putting the finishing touches to programs like title pages and high-score features. They also work on the protection of business and games programs."

Perfect

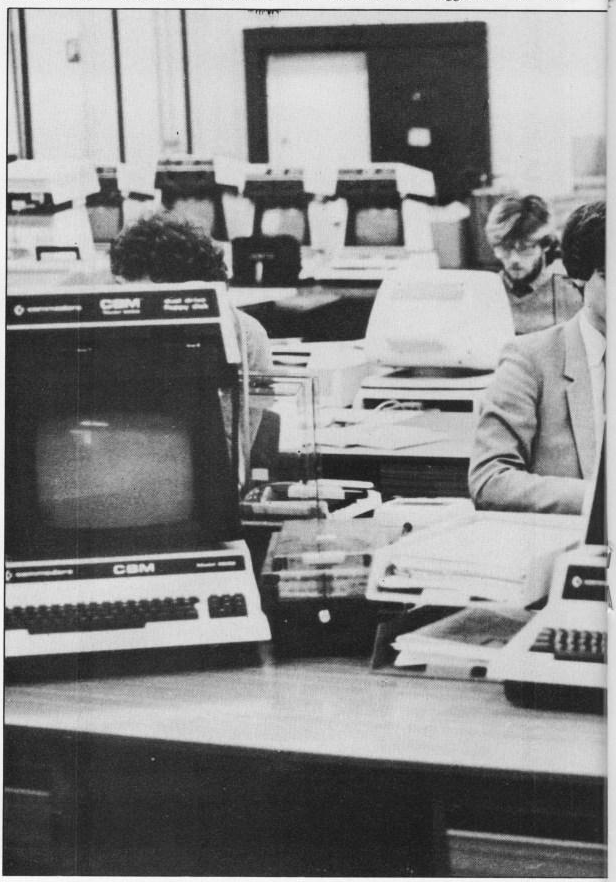
Some programs are submitted in nearly perfect form, though this is usually because they have been specially commissioned through outside software development houses. "The Patrick Moore astronomy program and Robert Carrier's Menu Planner were developed in this way, by a London company called Ivan Berg. In cases like this there isn't too much to be done here, since the software houses are working to a fairly strict set of instructions. John Lesage, my opposite number in the educational area, is working on a whole series of teaching programs at the moment. They'll cover the age ranges from 4 to at least 'O' Level, and here again some of the programs will be produced to commission and others have come from individuals. The Pixie Pack series is based on the work of a UK teacher, for instance."

Martin's workplace is a crowded desk in the middle of an enormous open plan office area. Commodore UK's headquarters, on an industrial trading estate in Slough, resembles a huge warehouse. Almost 200 staff work in the various areas, including spares and service, sales and marketing, the Vicsoft service, packing and testing areas, and a disk duplication section. Here, rows of PETs, and disk drives churn out disks from masters. Cassette duplication, however, is handled by an outside company.

Ideas

Martin's desk is piled with equipment, including a CBM 64, Vic 20, 1540 and 1541 disk drives, data recorders and a monitor. There are drawers full of software with accompanying instructions. The atmosphere is one of hard work and creative energy — and as Martin says, the open plan environment means that it's easy for him to consult his colleagues in other areas, if necessary just by shouting across the floor!

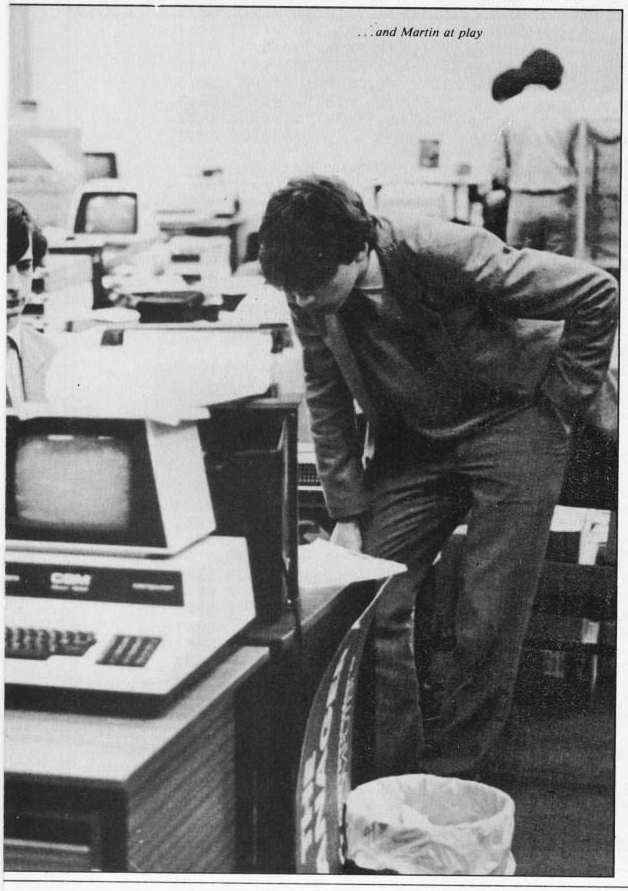
We looked at some of the programs Martin is currently working on. Many come in a very simple form, just a few comments and perhaps a sketch. For example, an idea for a game involving aerobatic displays of flying feats was accompanied by some fairly detailed ideas of how the game could be worked out. Martin's suggestions included the use of sprite graphics, the inclusion of a two player option, and the development of an animated title sequence. In this instance there was no actual program listing submitted at all — if the idea were to be implemented, a programmer would be commissioned to develop the idea from the sketches and suggestions of the



originator of the idea, with those additions made by the software review committee.

The creation of a title for the game would again be a group decision — "We'd just sit around until one of us got an idea that the others all liked. Commodore holds some names under copyright, and we could use one of these if suitable; but usually we find something based on the author's ideas. I'm also responsible for writing the game instructions in many cases, including International Soccer."

Another idea currently under development is a low resolution graphic art program. The author, Paul Jay, is also responsible for the game Face Ache. "In this case", says Martin, "the program was submitted in a well-developed form. You use the cursor to select the colour you want to paint in, then again to choose the shape you want to put on the screen. From there it's easy to build up attractive, colourful pictures. We think the program will appeal to children, as it has a definite educational value as well as being fun. In line with our policy of involving celebrity names with the programs, we decided to ask Rolf Harris to put his name to this one. He came down here to see the program and use it for himself, was very impressed with it, so we passed him on to our business people to negotiate the details. As a result this program will be marketed as Rolf Harris' Computer Painter. We're also looking forward to developing a high-resolution art program, and we're already planning graphics programs for the new 264 machine. Of course, we'd try to provide established software houses with a new machine to help them in their development work."



. . . and Martin at play

Another idea Martin's looking at is a form of flight simulator for the 16K Vic 20. "In this case I could see from the start that this had market potential, and it was only a matter of suggesting a few changes, such as introducing a radar screen rather than a numerical readout for distances."

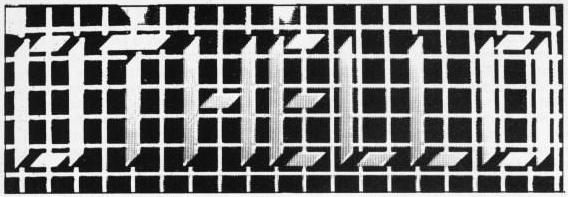
One field in which Commodore software is likely to expand is disk games. "Traditionally only business programs or massive adventure games came on disk, but the situation's changing. The 1541 disk drive is selling well, with the help of a promotion offering a low price when the disk drive is bought in a package with the CBM 64." In future there should be a wide selection of games on disk, including arcade types, intellectual games like chess, and adventures. There should also be a wide range of educational programs, and Commodore is aiming to persuade schools to go in for CBM 64 and disk drive packages to take advantage of this.

On the cartridge side, it seems likely that the only cartridges marketed here will originate in America. "If any really good games turn up here, we consider them for forwarding to America for evaluation as cartridges. But we won't be manufacturing any over here. Oddly enough, some of the cartridges that come over from America seem inferior to the programs we send across for consideration — I think it's just a matter of taste. Sometimes we have games programs submitted to us from Europe or America — perhaps because they've been rejected by Commodore in their country of origin — and again there seem to be odd differences in taste. What's popular in one country isn't necessarily to the liking of the users in another country."

Motives

Martin finds that authors of unsolicited programs have a wide range of motives. "Some of them think that getting a program marketed is a good way to make money — and they're right! Others have very little idea that it's possible to make money as a software author, and are just keen to see their games on the shelf in the local computer store. Again, in the case of the educational programs, some authors are just interested in making a contribution to education. Still, no-one's been known to turn down money for their program! Since we have such good distribution and high sales volumes for our software, royalties for authors can be very high."

Martin's job is moving away from straight software evaluation, and more towards development work. "Having said that," he adds, "I walk into work every morning with very little idea of what might come up next. I could be organising demonstrations for overseas Commodore staff, or for the press or at computer shows. At the moment I'm helping compile a directory to arcade games, and working on the instruction manual for a number of new games. I should think that after this interview's published I'll also have a flood of readers' programs to evaluate, but after all, that's what I'm here for!" ■



STAR GAME

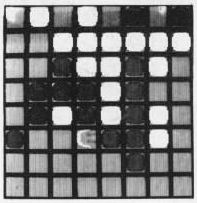
This month's star game is an intellectual puzzle rather than a test of the speed of your trigger finger. Othello, by ***S P Rogers,*** *is a challenging version of an ancient Chinese game*

THIS VERSION of Othello for the CBM 64 emulates a classic board game for two players. Although the game takes minutes to learn, it can take a lifetime to master. A single move can turn defeat into victory, and although the rules are simple the game is as rewarding and challenging as chess. The program uses multicoloured user-defined graphics, and includes REM statements which are valuable aids to an understanding of how the program works.

Players take it in turns to place counters on the board using the cursor keys or joystick in port 2, and the fire button or space bar. If the counter forms a line, either horizontally, vertically or diagonally, with another counter of the same colour, all the opposing counters on that line change colour.

The program will not allow you to make an illegal move, so you will soon pick up the rules. Counters must be placed touching another counter, and if it's impossible to play a go is missed by using F8. The program announces the score when every square on the grid is full.■

```
1 REM ************************************
2 REM *                                  *
3 REM *   OTHELLO (FOR TWO PLAYERS)      *
4 REM *                                  *
5 REM *      (C) 1983 S.P.RODGERS        *
6 REM *                                  *
7 REM ************************************
8 :
9 :
10 POKE56,56:POKE52,56:CLR
20 GOSUB58000:PRINT"        O.K TO CONTINUE? (Y OR N)          ":GOSUB1420
30 GETR$:IFR$=""THEN30
40 PRINT"":IFR$="N"THENEND
50 UD$="
60 DIMSC(2):DIMTU(1,65):FF=0
99 :
100 REM ****        BOARD CELLS        ****
110 DIMBO$(2)
120 BO$(0)="  AB   CDE   FGH"
130 BO$(1)="  IJK   LMN   OPQ"
140 BO$(2)="  IJK   LMN   OPQ"
199 :
200 REM ****  MAGNIFIED CHARACTERS ****
210 DIMCH$(7)
220 CH$(0)="  (*"":CH$(1)="RT  SU"
230 CH$(2)="Z£  I  ]"":CH$(3)="#%  $&"
240 CH$(4)="VX  WY"":CH$(5)="+-  /."
250 CH$(6)="/1  02"":CH$(7)="35  46"
299 :
300 REM ****    MAGNIFIED NUMBERS    ****
310 NO$(0)=CH$(2):NO$(1)="79  8:"
320 NO$(2)=";=  K>"":NO$(3)="?  H "
330 NO$(4)="  "":NO$(5)="  "
340 NO$(6)="  "":NO$(7)="  "
350 NO$(8)="  "":NO$(9)="O  H "
399 :
400 REM ****        SPRITE #0        ****
410 POKE2040,13
420 POKEV+28,1:POKEV+37,2:POKEV+38,7:POKEV+39,6
430 POKEV,26:POKEV+1,50
499 :
500 REM ****        SPRITE #1        ****
510 POKE2041,14
520 POKEV+29,2:POKEV+23,2:POKEV+40,14
530 POKEV+2,220:POKEV+3,83
599 :
600 REM ****  SELECT CHARACTER SET ****
610 POKEV+24,30
```



```
699 :
700 REM ****   SELECT MULTICOLOUR  ****
710 POKEV+22,216:POKEV+34,4:POKEV+35,9
799 :
800 REM ****       SET UP SCREEN     ****
810 GOSUB9010
899 :
999 :
1000 REM ********* MAIN LOOP **********
1010 POKES+24,0:F=F+3:IFF>3THENF=0
1020 POKEV+21,F:POKEV,26+24*(XX-1):POKEV+1,50+24*(YY-1)
1030 IFFFTHEN7000:REM COMPUTER REPLAY
1040 IFSC(1)+SC(2)=64THEN6000
1050 GETR$:JO=PEEK(56320)
1060 IFJO=125THENR$="■"
1070 IFJO=126THENR$="■"
1080 IFJO=119THENR$="■"
1090 IFJO=123THENR$="■"
1100 IFJO=111THENR$=" "
1110 IFR$="■"THENYY=YY+1:IFYY>8THENYY=1
1120 IFR$="■"THENYY=YY-1:IFYY<1THENYY=8
1130 IFR$="■"THENXX=XX+1:IFXX>8THENXX=1
1140 IFR$="■"THENXX=XX-1:IFXX<1THENXX=8
1150 IFR$=" "ANDBO(XX,YY)<1THENPOKEV+21,2:GOTO1210
1160 IFR$="■"THEN5010
1170 IFR$="■"THENFF=1:TU=0
1180 GOTO1010
1199 :
1200 REM ****    LOOK FOR LINES    ****
1210 F1=0
1220 FORDX=-1TO1:FORDY=-1TO1:F=0:IFDX=0ANDDY=0THEN1270
1230 FORI=1TO8:BO=BO(XX+DX*I,YY+DY*I):IFBO=0THENI=8:GOTO1260
1240 IFI=1ANDBO=PLTHENI=8:GOTO1260
1250 IFBO=PLTHENF=1:I=8
1260 NEXTI:IFFTHENGOSUB1310
1270 NEXTDY,DX
1280 IFF1THEN5010
1290 GOTO1010
1299 :
1300 REM **** UPDATE BOARD ,SCORES ****
1310 IFF1THEN1330
1320 Y=YY:X=XX:SC(PL)=SC(PL)+1:BO(X,Y)=PL:GOSUB1410
1330 FORJ=1TO8:IFBO(XX+J*DX,YY+J*DY)=PLTHENJ=8:GOTO1380
1340 IFPL=1THENSC(2)=SC(2)-1:GOTO1360
1350 SC(1)=SC(1)-1
1360 SC(PL)=SC(PL)+1:GOSUB1510
1370 X=XX+J*DX:Y=YY+J*DY:GOSUB1410
1380 NEXTJ:F1=1:RETURN
1399 :
1400 REM *** PRINT COUNTER ,NOISE  ****
1410 PRINTLEFT$(UD$,(Y-1)*3+1)TAB((X-1)*3)BO$(PL):BO(X,Y)=PL
1420 POKES+5,15:POKES+6,81:POKES+24,15
1430 POKES+4,129:FORT=25TO35:POKES+1,T:POKES,T:NEXT:POKES+4,128
1440 RETURN
1499 :
1500 REM ****      PRINT SCORES      ****
1510 PRINT"■■■■■■■■■"TAB(32);:FORI=1TO2
1520 PRINTNO$(INT(SC(I)/10))NO$(SC(I)-INT(SC(I)/10)*10)
1530 PRINT"■■■■"TAB(32)
1540 NEXT:RETURN
1599 :
5000 REM ****     CHANGE PLAYERS     ****
5010 IFPL=1THENPL=2:POKEV+3,125:GOTO5030
5020 PL=1:POKEV+3,83
5030 TU(0,TU)=XX:TU(1,TU)=YY:TU=TU+1:XX=1:YY=1:GOTO1010
5999 :
6000 REM ****      END OF GAME       ****
6010 POKEV+21,0
```

Continued on page 33

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```
6020 FORI=1TO50
6030 POKEV+35,6:FORJ=0TO50:NEXT
6040 POKEV+35,14:FORJ=0TO50:NEXT
6050 NEXT
6060 POKEV+24,21:POKEV+33,0:POKEV+32,0:PRINT"■■■■"
6070 PRINTSPC(14)"**************"
6080 PRINTSPC(14)"* GAME OVER *"
6090 PRINTSPC(14)"**************"
6100 PRINT"■■■       PLAYER ONE (BLUE) SCORED"SC(1)
6110 PRINT"■■■       PLAYER TWO (WHITE) SCORED"SC(2)
6120 PRINTSPC(14)"■■■■■PLAY AGAIN?"
6130 CLR:S=54272:V=53248:GOTO30
6999 :
7000 REM ****    COMPUTER REPLAY    ****
7010 IFTU>0THEN7050
7020 GOSUB9000
7030 PRINT"■"LEFT$(UD$,18)TAB(29)CH$(5)CH$(0)CH$(4)
7040 PRINT"■■"TAB(27)CH$(7)"  "CH$(2)CH$(3)"  "CH$(6)
7050 XX=TU(0,TU):YY=TU(1,TU)
7060 POKEV,26+24*(XX-1):POKEV+1,50+24*(YY-1)
7070 POKEV+21,3:GETR$:IFR$<>"£"ANDR$<>"←"THENPOKEV+21,0:GOTO7070
7080 POKEV+21,0
7090 IFR$="£"THEN7110
7100 IFTU(0,TU+1)<>0THEN1200
7110 FF=0
7120 PRINTLEFT$(UD$,17):FORI=0TO4:PRINTTAB(27)"                ":NEXT
7130 GOTO1010
7999 :
8000 REM ****    COPY CHARACTERS    ****
8010 FORBY=0TO7:X=0
8020 FORBI=0TO7
8030 IF(PEEK(53248+CH*8+BY)AND2↑BI)THENX=X+2↑(BI*2)+2↑(BI*2+1)
8040 NEXTBI
8050 POKEA+BY*2,X/256
8060 POKEA+BY*2+1,X/256
8070 POKEA+16+BY*2,X-(INT(X/256)*256)
8080 POKEA+16+BY*2+1,X-(INT(X/256)*256)
8090 NEXTBY:A=A+32:IFA=14576THENA=A+40
8100 RETURN
8999 :
9000 REM ****      FRESH BOARD      ****
9010 FORI=1TO8:FORJ=1TO8:BO(I,J)=0:NEXTJ,I
9020 BO(4,4)=2:BO(5,5)=2:BO(4,5)=1:BO(5,4)=1
9030 POKEV+33,14:POKEV+32,14:PRINT"■";
9040 FORI=1TO8:FORJ=1TO8:PRINTBO$(BO(I,J));:NEXT:PRINT"■■":NEXT
9050 PRINT"■■■■■■"TAB(27);:FORI=0TO4:PRINTCH$(I);:NEXT:PRINT
9060 PRINT"■■■■"TAB(27)BO$(1)
9070 PRINT"■■■"TAB(27)BO$(2)
9080 SC(1)=2:SC(2)=2:XX=1:YY=1:PL=1:TU=1
9082 GOSUB1510
9090 RETURN
9999 :
58000 REM ****        LOGO          ****
58010 V=53248:S=54272:POKEV+33,11:POKEV+32,11:PRINT"■";
58020 FORI=0TO5:FORJ=0TO19:PRINT" ■";:NEXTJ:FORJ=0TO19:PRINT"■";:NEXTJ,I
58030 FORI=0TO19:PRINT" ■";:NEXT
58040 PRINT"■■■■■■
```

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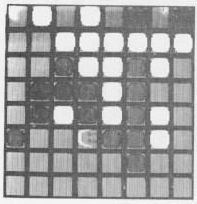
```
58160 PRINT"■    USE CURSOR KEYS AND/OR JOYSTICK"
58170 PRINT"■    PRESS ■F8■ IN A 'NO GO' SITUATION"
58180 PRINT"■IN COMPUTER REPLAY MODE ■(CTRL 'C')■ USE:"
58190 PRINT"    '■←■' TO CONTINUE , '■£■' TO REJOIN"
58200 PRINT"■GRAPHICS TAKE 100 SECONDS TO INITIALIZE■"
58210 IFPEEK(896)=255THENRETURN
58999 :
59000 REM ****   SET UP GRAPHICS   ****
59010 CH=1000:A=14336
59020 READD:IFD>255THENGOSUB59500:GOTO59020
59030 IFD<0THEN59100
59040 CH=CH+D:POKEA,D:A=A+1:GOTO59020
59100 POKE56334,PEEK(56334)AND254
59110 POKE1,PEEK(1)AND251
59120 FORI=0TO16:READCH:GOSUB8000:NEXTI
59130 POKE1,PEEK(1)OR4
59140 POKE56334,PEEK(56334)OR1
59199 :
59200 REM ****      CLEAR SPACE      ****
59210 FORI=0TO7:POKE14336+32*8+I,0:NEXT
59299 :
59300 REM ****       SPRITE#0        ****
59310 CH=1000:A=832
59320 READD:IFD>255THENGOSUB59500:GOTO59320
59330 IFD<0THEN59400
59340 CH=CH+D:POKEA,D:A=A+1:GOTO59320
59399 :
59400 REM ****       SPRITE#1        ****
59410 FORI=0TO62:POKE896+I,255:NEXT
59420 RETURN
59499 :
59500 REM **** CHECK SUM SUBROUTINE****
59510 IFD=CHTHENCH=1000:RETURN
59520 PRINT"■CHECK SUM ERROR IN LINE "PEEK(64)*256+PEEK(63):END
59600 :
59700 :
60000 REM**** BOARD GRAPHICS DATA  ****
60001 DATA170,170,149,149,149,149,149,149,2234
60002 DATA170,170,85,85,85,85,85,85,1850
60003 DATA170,170,86,86,86,86,86,86,1856
60004 DATA149,149,149,149,149,149,149,149,2192
60005 DATA85,85,85,85,85,85,85,85,1680
60006 DATA86,86,86,86,86,86,86,86,1688
60007 DATA149,149,149,149,149,149,170,170,2234
60008 DATA85,85,85,85,85,85,170,170,1850
60009 DATA86,86,86,86,86,86,170,170,1856
60010 DATA170,170,149,151,159,159,159,191,2308
60011 DATA170,170,85,255,255,255,255,255,2700
60012 DATA170,170,86,214,246,246,246,254,2632
60013 DATA191,191,191,191,191,191,191,191,2528
60014 DATA255,255,255,255,255,255,255,255,3040
60015 DATA254,254,254,254,254,254,254,254,3032
60016 DATA191,159,159,159,151,149,170,170,2308
60017 DATA255,255,255,255,255,85,170,170,2700
60018 DATA254,246,246,246,214,86,170,170,2632,-1
60099 :
60100 REM**** MAGNIFIED CHARACTERS ****
60101 DATA3,5,15,18,19,21,28,31,49,50,51,52,53,54,55,56,57
60199 :
60200 REM****      SPRITE DATA       ****
60201 DATA0,0,0,0,12,0,3,252,1267
60202 DATA0,15,240,0,63,0,0,60,1378
60203 DATA0,0,240,42,160,240,42,128,1852
60204 DATA240,42,0,240,0,0,240,0,1762
60205 DATA0,240,0,0,240,21,0,240,1741
60206 DATA21,64,240,21,80,252,21,80,1779
60207 DATA60,0,0,63,0,0,15,240,1378
60208 DATA0,3,252,0,0,12,0,1267,-1
```



Making sense of those peculiar little squiggles

Ever been infuriated by those incomprehensible graphic command characters? No idea how to get them to appear on your screen or what they do or where to find them on your keyboard? ***Kevin Bergin*** *gives you all the answers, in terms you and your Vic 20 or Commodore 64 can easily understand*

THE EDITOR and staff of Commodore Horizons have recently been beleaguered by their telephones! On the other end of the phones, readers have been posing questions like, "How do I get the graphics symbols on my 64?" The questions all seem to centre around the keyboard, and the use of colour in particular. This article will attempt to clarify the kind of problems encountered by our readers.

The keyboard on any micro is the user's way of communicating with their machine. It is therefore very important that the keybord is no mystery to the user. The 64 and the Vic have a 'QWERTY' keyboard, as on any standard typewriter. The numerics keys are along the top of the keyboard (1 to 0). No big difference so far, but the rest of the keyboard has special functions.

Top down

The most logical way to explain how to use the keyboard is to start at the top (numeric keys) and work down, filling in where needed. The key at the top left (left arrow key), has no special function, but can be used in programs.

The 64 has 16 colours (the Vic has 8), which may be accessed in different ways; but we will deal mainly with colours directly from the keyboard. The keys to use for the colours are the numeric keys 1 to 8. They must be used with the CTRL key or the LOGO key (bottom left). Below is a list of the keys to use and the colour they will give the print on the screen.

CTRL with:—

1 gives BLACK
2 gives WHITE
3 gives RED
4 gives CYAN
5 gives PURPLE
6 gives GREEN
7 gives BLUE (background colour at power up)
8 gives YELLOW

The keys 1 to 8 are marked with the above colours, but the other 8 colours are not marked but are accessed with (64 only):

LOGO and:—

1 gives ORANGE
2 gives BROWN
3 gives RED light
4 gives GRAY (1)
5 gives GRAY (2)
6 gives GREEN light
7 gives BLUE light
8 gives GRAY (3)

The above keys, used with the 'CTRL' or 'LOGO' key, will print in the full range of colours when used directly. Any of these keys used within quotes will produce a symbol, which the 64 recognises as a colour. There is a program included here which will demonstrate this.

To extend our use of colour, there are various registers that can be set to change the colour of the border, screen, cursor and background colours. They use the above colours, but the numbers do not quite match — for instance BLACK is 0 and WHITE is 1. Each number is one lower from program mode than directly from the keyboard.

Reverse

Here are a few examples of changing colours using POKE command. To change the screen and border colours the contents of locations 53280 (border) and 53281 (screen) (36879 for Vic border and screen) have to be altered.

To change the border to RED enter:

POKE 53280,2<and press return>

To change the screen to YELLOW enter:

POKE 53281,7<and press return>

For the Vic:

POKE 36879,42

Experimenting with the above addresses and varying the numbers after the comma will produce varying colours. Should the display become confusing, press RUN/STOP and RESTORE keys together. This will restore the screen colours.

The 9 and 0 key when used with the CTRL key turn reverse on and off. To turn reverse on, CTRL 9, to turn reverse off, CTRL 0.

The key marked CLR HOME has two operations. Pressed on its own it will place the cursor at the top left of the screen. Pressing SHIFT and CLR HOME will clear the screen. Both of these functions can be used in direct or program mode. In program mode they produce special symbols. The key marked INST DEL also has two functions; pressing this key alone will delete the character to the left. If this key is held down it will repeat (to repeat all keys enter POKE 650,128: to reset, enter POKE 650,10). Pressing SHIFT and INST DEL will open up a space for insertion.

Cursor

The two keys at the bottom right of the keyboard allow the user to move the cursor around the screen. To move the cursor right press CRSR (left/right arrow); to move the cursor left press SHIFT and the same key. To move the cursor down press CRSR (up/down arrow); to move down, the same key with the SHIFT. Both of the cursor keys repeat if held down. The space bar is in the usual place and repeats if held down.

The 64 and Vic have four large keys to the right of the keyboard. These are the function keys. They have no immediate use, but can be used quite easily (see program). The graphics symbols are used by pressing the symbol required with the SHIFT or LOGO key. Each graphic key has two symbols on it. To print the left-most symbol press the LOGO key and to print the rightmost symbol press the SHIFT key, with the symbol required. Clear now? Well try this:

LOGO and A
SHIFT and A

that should make more sense now. This can be repeated for all of the keys with graphics symbols on them.

There are two easy demonstration ▶

```
10 PRINT"■":REM CLEARS THE SCREEN
20 POKE53280,6:REM SET BORDER COLOUR TO BLUE
30 POKE53281,7:REM SET SCREEN COLOUR TO YELLOW
40 PRINT"■":REM SET CURSOR COLOUR TO BLACK
50 PRINT"■":REM CURSOR TO TOP LEFT
60 PRINT"■■■TRY CHANGING THE SCREEN AND BORDER":R
EM MOVES CURSOR DOWN
70 PRINT"■COLURS.  FIRST THE BORDER (0 TO 15)
80 INPUT"■■■WHICH COLOUR                ■■■■■■■■■■■■■";
A$:REM MOVE CURSOR LEFT
90 IFASC(A$)<48ORASC(A$)>57THENPRINT"■■■■■":GOTO8
0:REM MOVE CURSOR UP
100 IFVAL(A$)<0ORVAL(A$)>15THENPRINT"■■■■■":GOTO8
0
110 A=VAL(A$):POKE53280,A
120 PRINT"■■■■■■■■■■■■■■■AGAIN (Y/N)":REM MOVE CURS
OR RIGHT
130 GETB$:IFB$<>"Y"ANDB$<>"N"THEN130
140 IFB$="Y"THEN80
150 POKE53280,6:REM RESET BORDER
160 PRINT"■■■■NOW FOR THE SCREEN COLOURS"
170 INPUT"■■■WHICH COLOUR (0 - 15)          ■■■■■
";A$
180 IFASC(A$)<48ORASC(A$)>57THENPRINT"■■■■■":GOTO1
70
190 IFVAL(A$)<1ORVAL(A$)>15THENPRINT"■■■■■":GOTO17
0
200 A=VAL(A$):POKE53281,A
210 PRINT"■■■■■■■■■■■■■■■AGAIN (Y/N)":REM MOVE CURS
OR RIGHT
220 GETB$:IFB$<>"Y"ANDB$<>"N"THEN220
230 IFB$="Y"THEN170
240 POKE53281,7:CO=0
250 PRINT"■■WITH THE SHIFT KEY■■"
260 FORA=96TO127
270 IFA=126THENA=127
280 CO=CO+1
290 IFCO=>8THENPRINT"■■■":CO=0
300 PRINTCHR$(A);" ";
310 NEXT
320 CO=0:T=23
330 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■WITH LOGO KEY
"
340 FORA=161TO191
350 CO=CO+1
360 IFCO=>8THENPRINT"■■■":CO=0
370 PRINTTAB(T);CHR$(A);" ";
380 NEXT
390 PRINT"■■■■■■■■■■■■■■■■■PRESS 'F1' TO CONTINUE
"
400 GETA$:IFA$<>"■"THEN400
410 PRINT"■■         NOW THE CURSOR COLOURS"
420 PRINT"■■FIRST IN BLACK          ";
430 PRINT"■THEN IN WHITE"
440 PRINT"■■THEN IN RED             ";
450 PRINT"■NOW IN CYAN"
460 PRINT"■■UGH ITS PURPLE          ";
470 PRINT"■YUKKY GREEN"
480 PRINT"■■BLUE FOR YOU            ";
490 PRINT"■INVISIBLE"
500 PRINT"■■ORANGE                  ";
510 PRINT"■BROWN"
```

```
520 PRINT"■LIGHT RED                ";
530 PRINT"■GRAY (1)"
540 PRINT"■GRAY (2)                 ";
550 PRINT"■LIGHT GREEN"
560 PRINT"■LIGHT BLUE               ";
570 PRINT"■GRAY (3)"
580 PRINT"■":FORA=0TO15:POKE53281,A:FORDE=1TO2000 :NEXT:NEXT
590 POKE53281,7
600 PRINT"■PRESS 'F1' FOR LOWER CASE"
610 PRINT"■PRESS 'F3' FOR UPPER CASE"
620 PRINT"■PRESS 'F5' TO QUIT"
630 POKE198,0
640 GETA$:IFA$<>"■"ANDA$<>"■"ANDA$<>"■"THEN640
650 IFA$="■"THENPOKE53272,23
660 IFA$="■"THENPOKE53272,21
670 IFA$="■"THENPOKE53272,21:POKE53281,6:POKE53280,14:PRINT"■":GOTO690
680 POKE198,0:GOTO640
690 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■AGAIN (Y/N)"
700 GETA$:IFA$<>"Y"ANDA$<>"N"THEN700
710 IFA$="Y"THENRUN
720 END
```

◀programs to enter. The first one deals with most of the above information. The second and shorter program deals with colour in a different way. It turns on multi-colour mode (64 only). There is another colour mode (extended colour) this is turned on with POKE 53265,PEEK (53265)or 64 and is turned off with POKE 53265,PEEK(53265)AND191.

The first program merely takes you through the keyboard and demonstrates the different keys. There is a brief explanation of the program below, and the program contains many REM statements (for documentation).

The first line of the program (line 10) clears the screen. Line 20 sets the border colour to blue, and line 30 sets the screen colour to yellow (for the Vic, omit line 30, and line 20 should read POKE 36879,126). Line 40 sets the cursor colour to black and line 50 places the cursor at the top left of the screen (home position). Line 60 re-positions the cursor 3 rows down and prints a message, and line 80 finishes the message.

At line 80 an input is needed for the border colour. The symbols in line 80 move the cursor left. Line 90 checks that the input is within range. If it is not the cursor is re-positioned and the program jumps back to the input statement. Line 100 checks for the input being negative or being higher than 15. Again if the number is out of range the cursor is re-positioned and the program jumps to the input statement.

Line 110 sets the variable A to the value of A$ (A is used for the border colour). The POKE statement at line 110 changes the border colour. Line 120 asks for an input (the symbols are cursor right). LIne 130 waits for a legal press (in this case Y or N). Line 140 takes the action depending on the input. The border colour is reset in line 150.

The screen colours are displayed in the same way as the border colours by the routine from line 160 to 230. Line 240 (Vic should read POKE 36879,126) resets the screen colour and initialises the variable CO. The graphics available on your 64 are displayed by lines 250 to 380 (same for Vic, but the screen length is different so the variable CO will need altering). This is done by using the CHR$ statement within two loops and using the variable CO to control the line length.

CBM 64 only

```
10 POKE53281,7:REM YELLOW
20 POKE53282,1:REM WHITE
30 POKE53283,8:REM ORANGE
40 PRINT"■ABCDEFGHIJKLMNOPQRSTUVWXYZ"
50 PRINT"ABCDEFGHIJKLMNOPQRSTUVWXYZ"
60 PRINT"ABCDEFGHIJKLMNOPQRSTUVWXYZ"
70 PRINT"ABCDEFGHIJKLMNOPQRSTUVWXYZ"
80 PRINT"ABCDEFGHIJKLMNOPQRSTUVWXYZ"
90 FORI=0TO185
100 POKE55296+I,8
110 NEXT
120 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■PRESS F1 FOR
   MULTI-COLOUR"
130 PRINT"■■■■■■■■■■■■■■■■AND F3 FOR NORMAL"
140 GETA$:IFA$<>"■"ANDA$<>"■"THEN140
150 IFA$="■"THENGOSUB170:GOTO140
160 IFA$="■"THENGOSUB190:GOTO140
170 POKE53270,PEEK(53270)OR16:REM TURNS ON MULTI
COLOUR
180 RETURN
190 POKE53270,200:REM MULTI-COLOUR OFF
200 RETURN
```

Symbols

The colour symbols are demonstrated by the routine at line 410 to 580. Line 580 sets up two loops which change the screen colours slowly so as to be able to see the different colour combinations (for the Vic, line 580 should read 580 FORA = 8TO248STEP16:POKE36879,A:FORDE = 1TO2000:NEXT:NEXT and line 590 should read 590 POKE36879,126). Lines 600 to 680 select upper or lower case, and the routine at lines 700 to 720 restart the program or quit. For the Vic the following changes should be made:

line 650 POKE 53272,23 should be replaced with PRINTCHR$(14)

line 660 & 670 POKE 53272,21 should be replaced with PRINTCHR$(142)

The second shorter program, for the 64 only, is an example of multi-colour. It allows the user to flick between the standard and multi-colour mode using the function keys. To enter multi-colour mode the statement is POKE53270,PEEK (53270)OR16. To quit multi-colour mode the statement is POKE53270,200. There is hopefully enough useful information in this article for the novice to start on. We're planning to deal with more programming problems in future articles. ■

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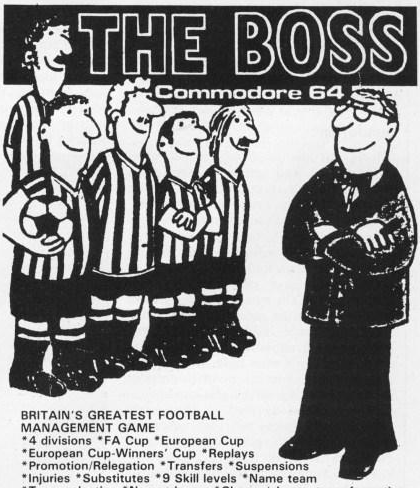

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Learning all about machine language the easy way

If you're confused by memory maps, data buses, stack pointers, flags, registers and conditional jumps, software author ***Stuart Sampson*** *will put you straight*

WHY DO people insist that machine-code is difficult? Why do experts insist that programming should be done in the highest level language possible? What is machine-code anyway?

Let's throw some of these phobias out the window and tell the Basic user that he has been using a machine code alongside Basic without knowing it. You don't believe me? Then what sort of high level language is:—

PLAY "03;1;3;5;6;8;10;04:1" or
VDU (28,121,0,0,0) or even
COLOR 2

A real high level language should recognise PLAY C MAJOR, or at least accept RED. In fact many micros accept Basic instead of numbers to program the microprocessor, but still expect the user to program the peripheral chips via numbers, that is in their machine code.

Reputation

It is this use of numbers that gives computers, and machine code in particular, the reputation of being difficult. The very use of the term 'code' implies an understanding barrier.

Say after me — *"machine language"*. That's better, at least we can think of French rather than Enigma!

Those who have grown to remember the meaning of the numbers used by Basic have no excuse for not attempting to use machine language. In fact it is less numeric when you use an assembler, to such an extent you don't even have to remember Line Numbers, you can point to parts of the program using meaningful labels!

However, you do need to grasp some of the principles of the notorious microprocessor to get it to sing and dance. (What! on 40 legs?).

The microprocessor spends much of its time like a Post Office sorter, putting items into pigeon holes. Let's imagine a demonstration model. Prepare a rack of little pigeon holes, open both sides, and a pile of wooden cubes that fit the holes. For a true model of an 8 bit processor system the rack should be 256 long by 256 high, but a smaller one will serve to illustrate the principles. We will also have a marker to write on the cubes any number up to 255.

The numbers written on the cubes are the *data*, the holes represent memory *addresses* that the processor can attend to.

To make your model more realistic you need to put certain numbered cubes into a few rows of holes, then cover them with a sheet of glass. This represents ROM, Read Only Memory. You can see the numbers but cannot change the cubes. Other rows must be covered also as there is no useable memory in these areas of the rack. Open holes represent RAM. Your rack is now becoming a *memory map*.

You now take the part of the processor. You start at address zero and start reading the numbers. The chances are that this area is under glass and contains instructions that form the beginning of the *operating system*. To get going they may tell you to copy some data into RAM. On our model the ROM will inform you of an address to find the data, in terms of two numbered blocks. The numbers tell you the count of columns and rows to get to the first cube carrying the data. You will write these on a notepad, your *registers*. The instructions will also tell you the address in RAM to copy the data to, and you note this in other registers, and perhaps a count of how much data to transfer. Then you are instructed to move the data. A microprocessor never moves data, it copies it, so you look at the source cube, write the number on a new cube and put it in the destination address, causing anything in that hole to fall out the back.

Pigeons

Of course we assume the destination is RAM, that is read/write memory represented by open pigeon holes. If it is not, you cannot get the cube in and must discard it.

We can carry the model further by erecting a board behind the rack (spaced so cubes can fall when displaced). In this board we cut a window and call the area *video RAM*. As the processor puts cubes into it the user can see the back of the cubes, which carry the character whose ASCII code is the number on the front. We can also give the user lettered cubes which he puts into a pigeon hole representing the keyboard. The processor looks at this on its travels to accept the user's input.

This model may seem frivolous, but it illustrates the principles of memory mapping, ROM, RAM, moving by copying, the destruction of data when

This month's gentle introduction to machine coding will be followed by more heady stuff. Next in line is a Basic assembler/disassembler for all 6502-based machines (yes, that includes the Vic and the 64). This will increase your understanding of bytes, buffers, strings and jumping — and allow you to put that knowledge into practice. As well as being explained in terms of commands, the assembler/disassembler is broken down into sub-routines which can be incorporated into your own programs. For example, there are decimal-hex routines, printing to either the screen or a printer and operating codes (by decimal value and mnemonics). Further suggestions are also given for adapting the routines to fit your own needs

RAM is written to, what happens if you write to ROM, the fact that not all the map has useful memory, and the action of memory mapped displays. With the model in mind let us think briefly of the hardware.

The processor handles numbers between 0 and 255, hereinafter called *bytes,* as on/off signals on 8 wires called the *data bus.* It also has 16 wires to select an address, called the *address bus,* and a *control bus* to send signals for read/write etc. The term *bus* is a collection of wires carrying *binary* signals. Connection to all these can be made via the computer's expansion port, and they also go to ROM, RAM, sound generators, VDU chips etc.

Buses

Inside the processor these buses are connected to a vast array of microelectronics, which thankfully can be represented as a small number of blocks in a "programmer's model".

At this point one should realise that all I have said applies to the majority of processors used in personal computers, but once inside the processor one must expect differences. However, there are common points.

All processors have a register called a *program counter,* which is used as a bookmark in the program of instructions. It carries the address of the next instruction to be obeyed.

All processors have at least one *accumulator.* This is where data is stored before number crunching, and it holds the answer afterwards.

All processors have at least two more registers that are generally used as a scratch pad or for noting addresses in some form.

All processors have a *stack pointer.* This is used to point to an address in an area of memory called a *stack.* This is an external scratch pad in which data is handled on a last-in-first-out basis. I will be explaining the use of this later.

All processors have a *flag* or *condition code* register, which is really a collection of yes/no memories reflecting the more important aspects of the last operation. The state of these can then be used to affect future events. As all useful programs involve getting the computer to act in response to certain conditions, the use of these flags is at the heart of machine language programming.

Of course all processors have an *instruction decoder* and an *ALU.* The latter is responsible for arithmetic and logical operations, coming between the instruction decoder and the accumulators. I use the plural because all processors use a temporary accumulator as well as the main one. The programmer need not worry about these last circuits on his model.

What the programmer needs to know to program in a processor's machine language falls into three main parts:— the processor's *instruction set,* the vocabulary: the processor's internal memory layout, the *registers:* and the computer's *memory map.*

You will also need to know a bit about I/O, input/output, which covers keyboard, joysticks, graphics, sound, cassettes etc., most of which form part of the memory map.

The other concept you need to get straight is the use of the *byte.* A byte is a whole number between 0 and 255, and consists of eight bits, which can be 1 or 0. The byte is the smallest unit of data the computer uses, and can be likened to a figure in a number. Our normal figures can range from 0 to 9, and to represent larger numbers we use two figures, multiplying the first by 10 and adding the second, and so on with further figures. The computer does this too, but with numbers to the base 256 it needs very few bytes to cope with the biggest numbers we ever need. Addresses are just two bytes and range from 0 to 65,535.

In fact we find that for many programs we rarely bother with more than two bytes at a time, particularly in machine language. The byte is very versatile, it can represent many things, such as:—

A boring old number
A text character
A graphics character
A colour, or even "paper and ink" colours together.
A group of picture elements in hi-res graphics.
A graphics point co-ordinate.

A machine language instruction (or part of one)

The operations that can be performed on these bytes are called "8 bit" operations, and they fall into three main groups. Firstly, copying to transfer, for instance LOAD (memory to register), STORE (register to memory) or TRANSFER (register to register). Secondly, single Byte operations like INCREMENT, DECREMENT, NEGATE, COMPLEMENT, SHIFT, ROTATE etc: and lstly, two Byte operations such as ADD, SUBTRACT, AND, OR, EXCLUSIVE OR, COMPARE.

Single byte operations can be done on bytes in registers or memory in isolation. Two byte operations almost always are done with one byte in the *accumulator* and the other in a memory or, for "80" type processors, in a register. The result is to be found in the accumulator.

All processors can also perform 16 bit addition, although in some it might be confined to deriving addresses, and all can perform some form of 16 bit transfer, albeit as two adjacent bytes.

I have now listed all but one group of operations of the average processor, and you might be excused for wondering what all the fuss is about. In fact you might wonder how such simple operations can result in the marvels your computer performs, particularly when loaded with a machine-code game program. The answer lies partly in the group we have yet to discuss, but the main reason is the tireless speed at which the operations are done. Just think that every time your cursor gets to the bottom the screen scrolls, and the processor has to read every individual character and write it to the line above. Do you perceive it as taking time?

I have said that all programs of any value require the computer to choose a course of action as a result of a previous operation Normally the processor reads the instructions from the program and executes them in order, using the *program counter* (PC) to follow the sequence. Suppose some operation upsets the progression of the PC, and loads it with a new value. The next instruction will be read from a different part of the program and a JUMP or BRANCH operation will have occurred.

Jumping

This may mark the end of a particular sequence or *routine,* in which case the jump will always happen, but all processors have the ability to perform *conditional* jumps or branches. When one of these is encountered the progression is only disturbed if a particular *flag* is set or cleared. This of course depends on the result of some past operation.

There are four flags that form the mainstay of conditional branching, and it is vital to know which are affected by which operations. The simplest is the *zero* flag. This is set when the result of an operation is zero, and often marks the completion of a sequence of loops, or that a particular condition is met, having compared two bytes and finding they are the same. From this derives the terminology of some processors — *"branch if equal"*, meaning "if the ZERO flag is set".

The *carry* flag marks carry or borrow in arithmetic operations, just as we do with our sums. This can be incorporated in the next arithmetic operations or used to control a branch. *Carry* also holds the bit shoved off the end by shift operations.

The *minus* or *sign* flag reflects the state of Bit 7 of the result, which is understood to mean negative if we are dealing in signed arithmetic. Rather than regard a byte as a number between 0 and 255, this notation allows it values between —128 and +127, and the upper bit is set for negative numbers.

Unfortunately the minus flag can be misleading, for instance if we add +115 to +125 we get +240. However the byte representing +240 in normal notation has its upper bit set to 1, and would appear to be negative (—16) in signed arithmetic. To cope with this, processors have an *overflow* flag, that warns that the minus flag is lying if it results from a signed arithmetic operation.

Conditional jumps are at the heart of the program structure, and usually harbour the bugs in your program. Either it jumps for the wrong condition, or to the wrong place, sometimes missing a valid instruction altogether causing a crash. This is where many take ▶

◀ their bat home and return to Basic, with its now comforting error messages.

Another variety of jump type instruction involves subroutines. These are jumps that divert to a much used part of the program and expect to return to the main sequence where it left off, exactly the way GOSUB works in Basic. In order to do this, the address of the next instruction of the sequence has to be stored before the value in the PC is replaced to cause the jump. This is where the *stack* comes in.

The *stack* is RAM used as a fast dumping ground where data is stored and retrieved on a sequential basis, last-in-first-out. It is managed by the *stack pointer,* which holds an address that automatically points to the most recent data put into the *stack*. The *stack* can be likened to a spring loaded plate dispenser, or rifle magazine, if you put something in, you have to remove all you put in after it to get it out again.

Stacking

In the case of subroutines, the jump, or *call,* stores the address of resumption, the *return address,* on the stack. When the subroutine is finished, the RETURN instruction withdraws the *return address* from the stack and puts it back in the program counter, causing execution of the program where it left off. In many cases you may want to preserve the contents of some other registers from destruction by the subroutine. The stack can be used for this too; you PUSH the register contents into the stack, a store operation under management of the stack pointer. To retrieve them a POP or PULL is used (as some processors seem to have a stronger spring than others!).

We cannot go much further before the character of the processors stops us talking generally. We now know something about what the processor can do, and how it knows what to do it to. We have both dimensions of the processor's *instruction set.* We also know that each instruction is provided as a byte, or sometimes two bytes, in the program, and

how the program counter keeps track of progress through this jungle of numbers — but how *we* cope with the jungle?

This is not obvious on many home micros, and seems to present another barrier to machine language programming. Often we need to buy extra software just to bypass the Basic interpreter in order to speak to the processor direct. It's as bad as a boss surrounded by secretaries telling you he's busy.

However, one intermediary is of positive value to those who prefer "words" to numbers, the *assembler.* This is a program that accepts *mnemonics,* and translates them into instruction codes on a one for one basis. It is not to be confused with a *compiler* which attempts to accept Basic and produce machine language. The mnemonics constitute *assembly language,* which varies according to the processor, but not so radically as the instructions numbers themselves. Assembly language is often called *source code,* which is assembled into *object code,* the actual numbers.

Scratch

Assembly language mnemonics are meaningful, although very abbreviated, and have to be written with a strict syntax. Some may argue that if you are starting from scratch there is so much to remember in assembly language that you might as well learn the object code, and in fact there are advantages in doing so. However the assembler has other virtues that ease life, so the choice is yours. The alternative is to write in numbers using a *monitor.* This is a smaller program, that you might need anyway, as an assembler does not help you to debug.

I don't think I can say any more about machine language without choosing a specific processor. When you take the plunge you will need a book on assembly language programming specifically for the processor in your Commodore micro. This should also give essential information on the memory map and peripherals. ■

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COMMODORE SOFTWARE FILE

Reactor

Andrew Cope from Stoke-on-Trent offers this game for the CBM 64.

THE OBJECT of the game is to clear the blockage in the nuclear reactor before the pressure builds up and the reactor explodes. There are three separate mazes and four levels of play. Use a joystick in port 2 or Q for up, A for down, (for left and) for right.

The program structure is as follows:

0-35	set up and titles
80-102	maze 1
105-259	the movement and scoring
400-430	decrease timing
500-530	the ending
1000-1999	instructions
2000-2090	hi-res graphics and programmable graphics
2900-3030	maze 2
5000-5200	hi-score, name input
6000-6130	maze 3
9000-9002	music

```
 0 REM ************************
 1 REM *                      *
 2 REM * REACTOR FOR CBM 64   *
 3 REM *                      *
 4 REM *    BY A.COPE 1983    *
 5 REM *                      *
 6 REM ************************
 7 HI=0:N$="APC"
 8 AI$="000059":YS=0
 9 S=0:XX=0:G=1
10 POKE53280,6:POKE53281,0
19 PRINT"■"
20 PRINT"■■■■■       COPYRIGHT (C) 1983 A.P.C."
21 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■■■HIGH SCORE "HI" BY "N$
22 PRINT"■■■■■■■■■■■■■■■■■■■
```

```
129 IFS>31ANDG=3THEN430
130 IFPEEK(197)=10ANDPEEK(Y+40)<>160THENGOTO230
131 IFPEEK(56320)=125ANDPEEK(Y+40)<>160THENGOTO230
132 IFVAL(TI$)=VAL(AI$)-000010THENPOKE53280,2
140 IFPEEK(197)=47ANDPEEK(Y-1)<>160THENY=Y-1:C=C-1:GOTO240
141 IFPEEK(56320)=123ANDPEEK(Y-1)<>160THENY=Y-1:C=C-1:GOTO240
150 IFPEEK(197)=44ANDPEEK(Y+1)<>160THENGOTO250
151 IFPEEK(56320)=119ANDPEEK(Y+1)<>160THENGOTO250
200 GOTO120
220 IFPEEK(Y-40)=0THENS=S+1:GOSUB9000
221 Y=Y-40:C=C-40
225 POKEY,81:POKEC,8:POKEY+40,32
229 GOTO120
230 IFPEEK(Y+40)=0THENS=S+1:GOSUB9000
231 Y=Y+40:C=C+40
235 POKEY,81:POKEC,8:POKEY-40,32
239 GOTO120
240 IFPEEK(Y-1)=0THENS=S+1:GOSUB9000
245 POKEY,81:POKEC,8:POKEY+1,32
249 GOTO120
250 IFPEEK(Y+1)=0THENS=S+1:GOSUB9000
251 Y=Y+1:C=C+1
255 POKEY,81:POKEC,8:POKEY-1,32
259 GOTO120
400 AI$="000049":YS=YS+S:S=0:G=2:GOTO30
420 AI$="000045":YS=YS+S:S=0:G=3:GOTO30
430 AI$="000039":YS=YS+S:S=0:G=1:GOTO30
500 POKE53272,21
501 PRINT"■■■■■■■■■■          YOUR TIME IS UP ...."
502 FORX=0TO500:NEXT:PRINT"□"
503 PRINT"■■■■■■■■■■ALTHOUGH YOU SCOREDM "YS
504 PRINT"■■■■■■■THE REACTOR BUILT UP PRESSURE"
505 PRINT"■■■■■■■AND EXPLODED , KILLINGM "(10000-(S*100))
506 PRINT"■■■■■■■YOU WERE PLAYING ON LEVEL M"G
510 FORX=0TO5555:NEXT
520 IFYS>HITHENGOTO5000
530 RESTORE:GOTO8
1000 PRINT"□■                    REACTOR"
1001 PRINT"□                     ......."
1010 PRINT"■■■CAN YOU CLEAR THE REACTOR OF BLOCKAGES"
1011 PRINT"■BEFORE THE PRESSURE BUILDS UP AND THE "
1012 PRINT"■REACTOR EXPLODES .. . .  . .. . . "
1013 PRINT"■■USE JOYSTICK IN PORT #2 OR KEYS -"
1014 PRINT"■■Q = UP"
1015 PRINT"■A = DOWN"
1016 PRINT"■C = LEFT"
1017 PRINT"■D = RIGHT"
1023 PRINT"■□■      PRESS  ANY  KEY  TO  CONTINUE      "
1024 IFPEEK(197)<>64THENGOTO1024
1025 IFPEEK(197)=64THENGOTO1025
1999 RETURN
2000 POKE52,48:POKE56,48
2005 POKE53272,(PEEK(53272)AND249)+12
2010 FORI=12288TO12288+7:READA:POKEI,A:NEXT
2020 DATA24,24,24,24,60,96,255,0
2030 FORI=13568TO13568+7:READA:POKEI,A:NEXT
2040 DATA255,255,255,255,255,255,255,255
2050 FORI=12544TO12544+7:READA:POKEI,A:NEXT
2060 DATA0,0,0,0,0,0,0,0
2061 FORI=12936TO12936+7:READA:POKEI,A:NEXT
2062 DATA24,126,24,60,90,24,36,36
2070 FORI=12672TO12744+7:READA:POKEI,A:NEXT
2072 DATA254,254,198,198,198,254,254,0,24,24,24,24,24,24,24,0
2073 DATA254,254,6,254,192,254,254,0,254,254,6,254,6,254,254,0
2074 DATA198,198,198,254,254,6,6,0,254,254,192,254,6,254,254,0
2075 DATA254,254,192,254,198,254,254,0,254,254,6,6,6,6,6,0
2076 DATA254,254,198,254,198,254,254,0,254,254,198,254,6,6,6,0
2090 RETURN
2900 GOSUB2000:TI$="000000"
2910 AI$="000099"
3000 PRINT"■■■■                                    "
3001 PRINT"□■                 ■          ■          ■      ■ "
3002 PRINT"□■          ■    ■ ■ ■      ■ ■          ■ ■    ■ ■  "
3003 PRINT"□     ■    ■ ■ ■ ■ ■ ■ ■■■ @ ■■ ■ ■          ■ ■     "
3004 PRINT"□■  ■ ■ ■ ■    ■ ■ ■ ■ ■   ■■■  ■  ■ ■            ■ ■ ■■■■ ■  "
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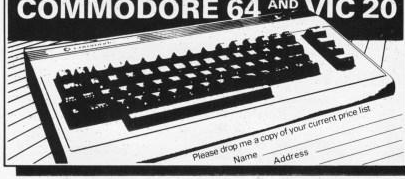

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3005 PRINT"□■ ■■■ ■■ ■          ■ ■ ■ ■ ■      ■    ■■■ ■              ■ ■  ■ ■  "
3006 PRINT"□■                ■ ■ ■          ■■   ■■■                ■ ■  ■ ■  "
3007 PRINT"□■ ■■■■ ■ ■      ■■■■ ■ ■      ■ ■ ■    ■■■ ■              ■ ■  ■■■■  "
3008 PRINT"□  ■■■■ ■  ■ ■ ■    ■ ■ ■■■■ ■■ ■ ■      ■ ■ ■              ■ ■    "
3009 PRINT"□■ ■      ■ ■      ■ ■    ■ ■ ■      ■ ■ ■      ■          ■ ■  "
3010 PRINT"□■              ■ ■ ■ ■ ■      ■ ■ ■ ■ ■ ■                  ■ ■  "
3011 PRINT"□■ ■   ■■■          ■ ■ ■ ■ ■      ■■■  ■■  ■■■■■          ■ ■  "
3012 PRINT"□■ ■ ■        ■■■■   ■   ■■■■ ■ ■ ■ ■      ■ ■■■ ■ ■ ■      ■ ■      "
3013 PRINT"□■ ■ ■          ■ ■ ■■■■■  ■ ■ ■ ■ ■ ■      ■ ■ ■ ■ ■ ■    ■ ■    "
3014 PRINT"□■ ■   ■      ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■      ■          ■ ■ ■  "
3015 PRINT"□■   ■ ■      ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■      ■ ■          ■ ■  ■  "
3016 PRINT"□■      ■■■■■  ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■      ■ ■          ■ ■■■■■  "
3017 PRINT"□■          ■ ■ ■■■■■  ■■■■■ ■ ■ ■ ■ ■ ■      ■ ■          ■ ■ ■ ■  "
3018 PRINT"□■ ■■■ ■■       ■ ■ ■■■■■  ■■■■■ ■ ■ ■ ■      ■ ■          ■ ■ ■ ■■■"
3019 PRINT"□■            ■ ■ ■  ■ ■ ■ ■ ■ ■ ■      ■ ■          ■ ■■■■  ■ ■  "
3020 PRINT"□■            ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■      ■ ■          ■ ■  ■ ■  "
3021 PRINT"□■            ■  ■■■ ■ ■    ■    ■      ■■■          ■ ■  "
3022 PRINT"□■                                                    ■■■"
3029 Y=1226:C=55498
3030 GOTO115
5000 POKE53280,0:POKE53281,6
5010 PRINT"□□□□            A NEW HIGH SCORE"
5020 PRINT"                ----------------
5025 HI=YS
5030 PRINT"■■■■■■■■■■■■■■■■OF";HI
5040 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■ENTRE YOUR INITIALS"
5050 PRINT"■■■■■■■■■■■■■■■■■■■
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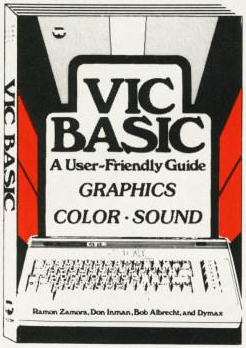

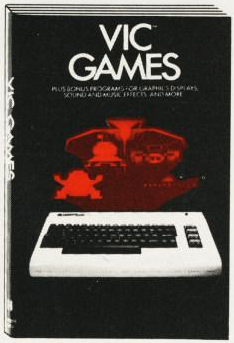

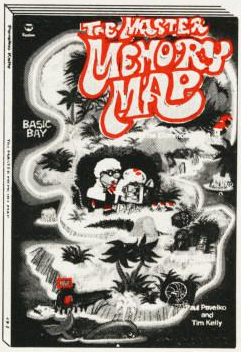

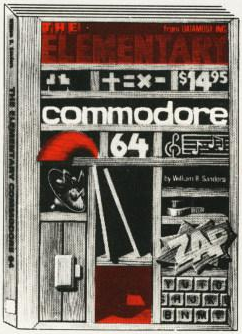

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The routines are straightforward. They produce some interesting sound effects which you can incorporate into your own programs.

In program 4, line 30 is a pause loop which pauses for the set time until it goes onto the next line. This is set at 00 but can be changed.

In program 5, the colour demonstration program, the value of the step can be changed to any number smaller than 200 but it must be a minus number. In this program you will have to press run/stop to get out of the loop. Steps -50 to -60 create dazzling screens. Steps -64 to -160 create interesting effects. The table of sounds is easy to use. It makes different sounds by mixing two or three voices together, for instance, for sound 1 you type:

POKE 36878, 15:POKE 36874, 199:POKE 36875,217

The sound programs can be experimented with to create your own sounds.

PROGRAM 1

```
10 S=36876:V=36878:POKEV,15
20 FORP=10TO1STEP-1:POKEV,P
30 FORO=250TO190STEP-P
40 POKES+1,O:NEXT
50 POKES+1,0:NEXT
```

PROGRAM 2

```
10 S=36876:V=36878:POKEV,15
20 FORP=15TO0STEP-1:POKEV,P
30 FORO=240TO135STEP-5:POKES,O
40 NEXTO,P:POKES,0
```

PROGRAM 3

```
10 S=36876:V=36878:POKEV,15
20 FORP=1TO10
30 FORO=250TO190STEP-P:POKES+1,O
40 NEXT:POKES+1,0:NEXT
```

PROGRAM 4

```
10 S=36876:V=36878:POKEV,15
20 FORP=15TO0STEP-1:POKEV,P
30 FORO=1TO00:NEXT
40 FORI=220TO240:POKES,I:NEXT:NEXT
```

PROGRAM 5 <COLOUR>

```
10 S=36879
20 FORO=1TO500
30 FORP=200TO0STEP-1:POKES,P
40 NEXTP,O
```

SOUND TABLE

POKE 36874	POKE 36875	POKE 36876
1	199.....217	
2	217.....180	
3	175.....182	
4	207.....163	
5	143.....197.....165	
6	191.....129	

Meanies

A GAME for the unexpanded Vic 20 from Colin Duncan of Northwich, Cheshire.

ASTRO MEANIES is an arcade-style game for the 3.5K Vic. You are a scout making your way home across your planet. On the way you run into an ambush. It's the dreaded Astro Meanies! Given the chance they will encircle and destroy you. Kill as many as you can using your laser, without letting them touch you. You begin with three lives, but these won't last long.

Controls are A = left, D = right, X = down, S = fire.

```
 1 POKE56,28:POKE52,28:GOSUB2000
 5 POKE650,255:POKE36869,255
10 PRINT"■":POKE36879,8:FORI=8120TO8185:POKEI+30720,5:POKEI,5:NEXT
11 PRINT"■■■■■■■■■■■■■■■■■■■■■";
12 PRINT"DEC       DEC       DEC";
13 PRINT"EEEC     DEEEC     DEEE";
14 PRINT"EEEEEC  DEEEEEC   DEEEE";
15 X=5:Y=10:D=1:S=0:SC=7680:CL=38400:R=1
20 DIMX(5),Y(5):FORI=0TO5:X(I)=99:NEXT
50 FORI=0TO5:GETA$:IFA$=""ANDD=0THENPOKE36877,0:GOTO100
51 POKE36878,2:POKE36877,240
55 POKESC+Y*22+X,32:X=X+D/R
56 REM **YOUR CONTROLS*
60 D=D+(A$="A")-(A$="D"):IFD>1THEND=1
65 IFD<-1THEND=-1
70 Y=Y+(A$="W")-(A$="X")
75 IFX<0THENX=21
80 IFY<1THENY=1
```

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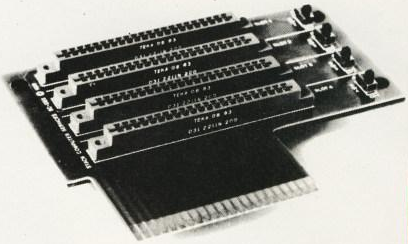

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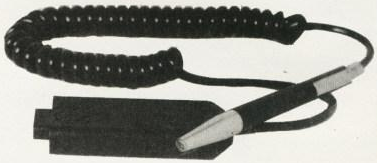

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```
 85 IFX>21THENX=0
 90 IFY>15THENY=15
 95 POKECL+Y*22+X,3:C=0:IFD=-1THENC=0
 96 IFPEEK(SC+Y*22+X)=32THEN99
 97 R=R+1:POKE36876,250:FORL=1TO2:NEXT:POKE36876,0
 98 POKECL+Y*22+X,2:IFR>5THEN1000
 99 POKESC+Y*22+X,C
100 IFA$<>"S"THEN200
101 POKE36878,9:FORD1=255TO230STEP-1:POKE36877,D1:NEXT
105 D1=D:IFD1=0THEND1=1
110 X1=INT(X)
115 X1=X1+D1:POKECL+Y*22+X1,7:P=PEEK(SC+Y*22+X1):IFP=32THEN150
120 FORJ=0TO5:IFY=Y(J)ANDX1=X(J)THENX(J)=99:S=S+10
125 NEXTJ
130 POKE36878,15:POKE36877,130
145 GOTO155
150 POKESC+Y*22+X1,2:IFX1<21ANDX1>0THEN115
155 FORX2=INT(X)+D1TOX1STEPD1:POKESC+Y*22+X2,32:NEXT
160 POKE36877,0
200 IFX(I)=99THEN250
205 POKESC+Y(I)*22+X(I),32:IFRND(1)<.4THEN225
210 Y(I)=Y(I)+(Y(I)>Y)-(Y(I)<Y)
215 X(I)=X(I)+(X(I)>X)-(X(I)<X)
220 GOTO246
225 X(I)=X(I)+INT(RND(1)*3-1):Y(I)=Y(I)+INT(RND(1)*3-1)
230 IFX(I)<0THENX(I)=21
235 IFY(I)<1THENY(I)=0
240 IFX(I)>21THENX(I)=0
245 IFY(I)>15THENY(I)=15
246 IFY(I)=YANDX(I)=INT(X+.5)THENR=R+1:POKECL+Y*22+X,2:IFR>5THEN1000
247 POKECL+Y(I)*22+X(I),4:POKESC+Y(I)*22+X(I),1
250 IFX(I)<>99ORRND(1)<.9THEN255
251 X(I)=INT(RND(1)*22):Y(I)=INT(RND(1)*14)+1
252 POKE36878,15:FORL=250TO150STEP-1:POKE36876,L:NEXT:POKE36876,0
255 NEXTI:PRINT"■■■SCORE:■";S
260 GOTO50
1000 POKE650,0:POKE36878,0:POKE36877,0
1005 FORI=1TO1000:NEXT:PRINT"■□■ANOTHER GO Y/N":
1006 GETA$:IFA$=""THEN1006
1007 IFA$="Y"THENRUN
1010 END
2000 PRINT"□"
2001 REM **HI-RES**
2010 FORI=7168TO7168+6*8-1:READD:POKEI,D:NEXTI
2011 FORI=7424TO7431:POKEI,0:NEXTI
2012 FORI=7168+48*8TO7168+58*8-1:READD:POKEI,D:NEXTI
2015 RETURN
2020 DATA0,60,126,171,126,60,66,129
2030 DATA129,195,231,255,153,36,36,66
2040 DATA0,126,0,255,255,0,126,0
2050 DATA128,192,224,240,248,248,254,255
2051 DATA1,3,7,15,31,31,127,255
2055 DATA255,255,255,255,255,255,255,255
2060 DATA0,126,66,66,66,66,66,126
2070 DATA0,8,24,8,8,8,8,8
2080 DATA0,126,2,2,126,64,64,126
2090 DATA0,126,2,2,126,2,2,126
3000 DATA0,66,66,66,126,2,2,2
3010 DATA0,126,64,64,126,2,2,126
3020 DATA0,126,64,64,126,66,66,126
3030 DATA0,126,66,2,2,2,2,2
3040 DATA0,126,66,66,126,66,66,126
3050 DATA0,126,66,66,126,2,2,126
```

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Drawing

For the Vic 20 with Super Expander, from Michael Reeve. Please contact us with your address, Michael!

THIS PROGRAM enables you to draw a picture or pattern of your choice. The program requires a joystick but can be converted to key control. The fire button changes the border colour. You can choose the location where you want to start. First you input the A number (horizontal axis), then you input the B number (vertical axis). You can also choose to draw in a thick or thin line.

```
1 G=0
2 GOSUB2000
10 COLOR0,5,1,7
20 GRAPHIC2
40 X=RJOY(0)
45 IFW=2THENGOSUB300
50 IFX=1THENGOSUB200
60 IFX=2THENGOSUB220
70 IFX=8THENGOSUB250
80 IFX=4THENGOSUB270
82 IFX=128THENGOSUB320
85 IFA>1012THENA=1012
86 IFB>1012THENB=1012
87 IFA<12THENA=12
88 IFB<12THENB=12
90 GOTO40
200 DRAW2,A,BTOA,B-5
205 B=B-5
210 RETURN
220 DRAW2,A,BTOA,B+5
225 B=B+5
230 RETURN
250 DRAW2,A,BTOA+5,B
255 A=A+5
260 RETURN
270 DRAW2,A,BTOA-5,B
280 A=A-5
290 RETURN
300 DRAW2,A-10,B-10TOA+10,B-10TOA+10,B+10TOA-10,B+10TOA-10,B-10
310 RETURN
320 G=G+1
330 COLOR0,G,1,7
340 IFG=15THENG=0
350 FORJ=1TO150:NEXT
360 RETURN
2000 POKE36879,28:PRINT"■□*****DRAWING*********"
2005 PRINT" STARTING POSITION       A(512),B(512) IS THE    CENTRE"
2010 PRINT:PRINT"■ PLEASE ENSURE THE    ";
2012 PRINT"  LAST DIGIT YOU INPUT  IS 2 "
2015 PRINT"■ ANY NUMBER FROM         12-1012 ":PRINT
2020 INPUT" A;NUMBER ";A
2030 INPUT" B;NUMBER ";B
2040 PRINT"■THICKNESS OF LINE       1=THIN/2=THICK"
2050 INPUT"THICKNESS";W
2060 IFW=1ORW=2THEN3000
2070 GOTO2040
3000 RETURN
```

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Getting down to printing

A L Minter looks at the running costs of printing

IT IS SAID that no person who has to ask about the petrol consumption of a Rolls Royce can afford such a car. Similarly, if you need to worry about the running costs of your printer, perhaps you made a wrong choice. Just buying a printer is only the start of it all. Once you have taken this irreversible step, you have set the scene for all your running costs and also determined whether the system will work satisfactorily. This article covers some of the things you need to consider before you actually buy your printer.

First, will it run on your computer? Cables may turn out to be extra, and the one supplied may not actually fit the port at the back of your computer. Even worse, you may have to buy an interface, which converts whatever signal the computer sends into something the printer can understand. Some systems have to have "addressable" interfaces. A non-addressable interface cannot tell the difference between a printer and a disk drive. A few printers come complete with one or more interfaces already included in their circuitry. Check these points with the printer salesman and make sure that he understands that the sale is conditional on the printer actually working properly on your computer. If this is clear, you can have recourse to the various consumer protection laws should it fail to work.

Second, what sort of paper does it consume? Ordinary white paper costs around 0.5p per sheet at A4 size. If the printer will only use perforated continuous paper, than you can expect to pay £10.00 or more for 2,000 sheets of cheap paper (tears easily). If your printer is one of the super-quiet thermal affairs, then expect to pay 2.5p or more per A4 sheet in a roll of thermal paper. And the blue type fades easily in the daylight. Aluminium-faced paper is even more expensive. So if you are going to do a lot of program development, be careful about the printer and its appetite for paper.

Scrounging

There are printers that take plain paper. These either have a roller, like a typewriter, or a feed roller that pushes the paper past the printing bar. On these printers you can use teleprinter rolls (cheaper than perforated paper), or you can make up your own rolls. This is done by scrounging the ends of the newsprint rolls from your friendly local newspaper, and cutting them up into sections 8½ ins wide (or whatever) with a hand saw or, better still, with a circular saw. You will have to make up a suitable feed mounting. This gives you an enormous supply of very cheap paper, of poor quality, but just the job for lots of rough work. You can always replace with good paper for final copies.

If you will want to print on narrow paper for any reason, bear in mind that many printers (with or without roller) grip the paper by two pressure rollers about two inches on each side of the centre of the roller. This means that a narrow paper must also be centred, and you may have to modify your program to print at a TAB position when using this paper. By the way, if you want to print a lot of labels, you *can* get by with rolls of gummed labels, but with no tractor feed the alignment can drift and you have to keep checking.

Next, we come to the small matter of ribbons. A printer that uses ordinary typewriter ribbons is easily maintained. Some manufacturers specify the use of their own ribbons; this is because dot-matrix printers depend on the oil in the ink for lubrication of the wires in the print-head, but many people seem to have found that performance with typewriter ribbons is satisfactory. With a plain-ribbon machine, you only have to buy a typewriter ribbon and, if the spools do not fit, then just re-wind it. If your original ribbon has eyelets at the end, then the new ribbon must also have eyelets. These reverse the ribbon feed at the ends of the spools.

The real fun, though, is with printers that have the ribbon in a cartridge or cassette. These always seem to have been designed specially for the particular machine. They are expensive, and do not always last very long. When the printer is made obsolete by the manufacturer, or he just goes out of business, then the cartridges will cease to be available, and you will have problems . . . I have a perfectly good printer, which has built-in interfaces for IEEE, Centronics and RS232, takes plain paper, and the design is such that it uses the whole width of the ribbon (a nice touch that — some printers only work in the middle of the ribbon). As the manufacturer went bust, I can't get replacement ribbons.

Cartridges can be re-filled, with some difficulty. To to this, join a new ribbon to the old one, and wind it into the case, pulling the old ribbon out as you go. Joining is difficult; make a scarfed (angled) joint, and stick the two ends together with Evo-stik or Copydex and don't get it twisted. Ribbons have also been revived by opening the cartridge and spraying with WD40, or putting in stamp-pad ink. If you want to, you can buy ribbon in wholesale rolls; 600 metres costs about £18.00. See under Typewriter Supplies in the *Yellow Pages*.

Do not be too impressed by statements of ribbon life. An A4 page, 70 characters to a line and 60 lines to the page, will contain something like 3,600 actual characters printed. A claimed ribbon life of 100,000 characters will only do 28 pages, or six big listings.

Temptation

The fourth matter is the temptation to go all modern and get a daisy-wheel printer. Some of these are now quite cheap, and they do allow you to produce "real" typing from your computer — if that's what you want to do. However, there are snags. There is the matter of the interface — will it meet the requirements outlined above? Where does it get its power from? And has it been properly wired up for your computer? A daisy-wheel printer will take plain paper, almost by definition, but do you have to buy an expensive tractor-feed attachment if you want to use it for continuous paper? And will it work with the paper right at one end of the roller, as a typewriter should, and most dot-matrix printers won't? The ribbon nearly always seems to come in a cartridge. Is it a cartridge that fits a common electric typewriter, so that you can get one locally? And how much ribbon in it? (I found only six yards in my genuine Olivetti cartridge).

Then there are the daily-wheels themselves. The whole idea is that you can easily whip one wheel out and put in another, with a different type-face. A great idea, which is somewhat tainted when you discover that the makers of the cheaper daisy-wheel printers or electric typewriters which can be driven from a micro have all gone for the most expensive daisy-wheels. Thus, Olivetti and Adler-Triumph wheels cost £20.00 or more each, with Brother only a little way behind. The idea that daisy-wheels are cheap comes from the Qume/Diablo wheels, which cost about a fiver a time, but don't fit any of the cheap daisy-wheel printers. When you are shopping for such a printer, discuss this point carefuilly with the salesman, and watch out for being told how cheap and easy they are to get.

Practical operation of your printer should be accompanied by a careful reading of the manual. What it will not ram home to you is such small points as the fact that a printer with a paper-presence or low-supply detector will make the whole system "hang" if you run out of paper. You can spend hours trying to recover from this problem if you didn't know.

When you choose a printer, take the time to consider all these important aspects, and you will gain a useful piece of equipment, rather than an expensive liability. ■

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ANSWER BACK

Taking flight

ALL COMMODORE owners I know are screaming for a decent flight simulator for the 64 or Vic 20. Any ideas? Are Commodore bringing out a cartridge to upgrade the Vic 20 to a CBM64?
Peter Mulholland
Harrogate
IT DEPENDS on what you mean by a decent flight simulator! Most of the ones available for other computers display a flight path, and a panel of information showing airspeed, altitude, flaps, throttle, fuel and so on.

Anger Productions, 14, The Oval, Broxbourne, have just released a simulator for the 64 which includes all of these features and more. It's available for £9.95, or £11.95 on disc, by mail order and from selected computer dealers.

As to upgrading the Vic 20 to a 64, it is theoretically possible, but isn't very practical. Commodore thought at one time of offering an exchange deal, but after their substantial price reductions this proved unnecessary.

Making a deposit

I HAVE a problem with my 64. When trying to use the RUN/STOP button with the RESTORE button to return the display to its original colour and condition, the RESTORE button works only after repeated presses. Could you comment on this problem?
James C Thurgood
Cullercoats
THIS PROBLEM occurs in many 64's. It isn't a special feature to stop you from accidentally RESTOREing an important program — it's caused by deposits on the underside of the key, which prevent the key making contact with the printed circuit board beneath. Take the machine to your dealer to have the key cleaned with a special solvent.

Altered states

I'M PLANNING to buy a CBM 64, 1541 disk drive and 1525 printer. In another year I will be living in the United States. Will I be able to use a British system over there, with their 110 volts 60 cycle current?
Charles Lemon
Sandbank
THE VOLTAGE could be corrected by using a transformer, but this wouldn't solve your problem. You would need to use a dual standard television (unless you bought a British monitor) because American televisions operate on the NSTCC standard, which is not compatible with our PAL standard computers.

Small screen

I AM THE owner of a Vic 20. Though it is a wonderful computer, its drawback is its screen size. Are there any cartridges available to increase the screen size? And is it possible to run Atari cassettes on a Commodore computer?
Steven Hull
London
STACK ELECTRONICS manufacture a 40/80 column card which will increase the screen size appropriately. It's available through Commodore's Vicsoft service, among others. There's no way to run an Atari cassette on a Commodore machine.

Tuning trouble

I HAVE recently purchased a Commodore 64, but alas I cannot get a clear sound and picture at the same time on my television. However I try to adjust the picture sharpness I lose the sound. My TV is only a few months old so I assume the fault is with the computer.
R T Davey
Rustington
W. Sussex
I SUGGEST that you take your 64 back to your dealer and check whether it will tune successfully with one of their televisions. If not, ask them to adjust the tuning of the computer in accordance with the CBM service notes dated August 83, which should have been sent by Commodore to all authorised dealers.

Help from A to Z

I RECENTLY purchased a CBM 64 with disk drive and printer for my business, but I cannot find a word processing program which will do an index. All I require is to file items on disk and sort them into alphabetical order at intervals. Can you assist?
K Sloan
Police Review
Stockport
TRY SUPERBASE 64, which will allow you to index on any field in your record. Superbase is available from Precision Software, 6, Park Terrace, Worcester Park, Surrey, 01-330 7166. This is a database program which seems more versatile than other similar programs which provide for indexes.

Dead heads?

THOUGH I'VE got used to using my CBM 64 by typing in and saving on tape my own programs, no matter what I do I cannot get any of the software I've bought to load into the computer from the recorder. Can you help?
Frederick Batson
Redditch
IT SOUNDS as if your C2N cassette heads are not properly aligned, since it will read programs recorded on it but will not read programs recorded on properly aligned heads. Your best move would be to take it back to your dealer for adjustment or replacement.

Random problems

I RECENTLY bought a book of computer games supposedly playable on several home computers including the CBM 64. However, the following line seems to occur quite frequently, and is unacceptable to the 64.

```
RANDOMIZE VAL(RIGHT$
(TIME$,2))
```

I presume it is something to do with the TI clock, but I have tried everything I can think of without success. Can you help?
J I Perrin
Burton opon Trent
RANDOMISE is not used as a keyword in Commodore Basic. In some versions of Basic it would be used to generate random numbers, as in 10 LET a = RND.

The example you give suggests that the program requires random numbers from 1 to 60, since the rightmost two characters of TI$ represent seconds. A suitable routine for the Vic or 64 would be

```
10 A = RND (—TI): REM
Sets the random number
generator
20 A = RND (1):A = INT
(A*60 + 1.001): REM Gives a
whole number from 1 to 60.
```

The routine would then loop back to line 20.

Graphics answer

WHEN IT comes to coping with graphics on the 64 I haven't got a clue. Can you recommend any books, or is there anywhere in my locality that could help? I don't just want to use the 64 for playing games — it's too expensive for that!
Sioux James
Wallasey
THIS IS a question I love to answer, because I can recommend (although I might be biased), Pictograph, a cartridge-based picture making program written by my son Daniel, using a joystick to draw and paint. Pictograph is available direct from me at 30 Brancaster Road, Newbury Park, Ilford, Essex, price to Commodore Horizons readers £19.95.

For local help, try contacting the Merseyside Commodore Users' Group, c/o Jeff Jones, 41 Virginia Avenue, Lydiate, Merseyside.

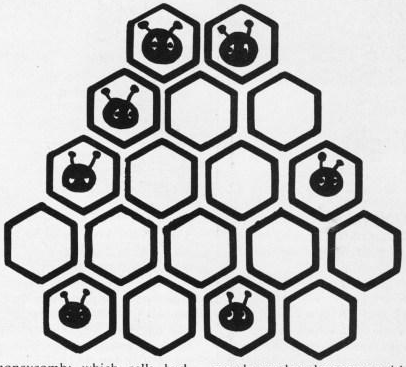
If you need help with a technical query or problem write to Jack Cohen, Commodore Horizons, 12-13 Little Newport Street, London WC2R 3LD

COMPETITION CORNER

Synthesise speech courtesy of Adman

***Tony Roberts** tests your skill — Adman Electronics presents the prizes*

Send your answers to Competition Corner, Commodore Horizons, 12-13 Little Newport Street, London WC2R 3LD — to arrive no later than the last working day in the month on the cover of this issue. The name of the winner, and the solution to the puzzle, will be published in the issue after next. Entries will not be acknowledged and we cannot enter into correspondence on the result



LAST MONTH'S meeting at the Hell Nook Micro Club only lasted ten minutes — there was a hurried escape when a small piece of boarding fell from the wall with a crash — revealing some honeycomb and a considerable quantity of rather upset bees. After some minutes Zena, being more intrepid than the rest of us, donned a makeshift veil and re-entered the meeting Hall — and soon re-appeared to announce that all was now clear — and that the piece of honeycomb revealed had an odd property. Taking the cells containing young bees as "1" and those without, "0", all the numbers from 1 to 11 (in binary of course) could be read from straight rows of honeycomb cells. When we had a look, however, a couple of the bees had crawled out from their cells — here's the remaining honeycomb: which cells had the two bees occupied?

Answer the question correctly and you could win one of two Adman Electronics Speech Synthesisers for the Vic or 64. The unit plugs into the computer's expansion slot, and has an infinite vocabulary which you can program to add a new dimension to your games or educational programs.

When you've solved the puzzle, send us the answer with details of which computer you own, and complete this tie-breaker in an apt and amusing manner in 15 words or less: "I want to own an Adman Speech Synthesiser because . . ."

The winner of our February competition is Greg McNelly of Taunton, whose prize is a 1520 printer/plotter from 64 Supplies. The missing line was 120 DATA 5,1,5,2,4,2,3,3,3.

MARKET VIEW

No sign of any let-up

IT MUST BE galling for Commodore chairman Irving Gould that no sooner has the company announced that sales in calendar 1983 passed the one billion dollar mark — 1,042 million dollars to be precise — than the chief executive and company founder Jack Tramiel abruptly resigns, followed closely by a quartet of top managers.

The financial picture is unchanged. At the Consumer Electronics Show at Las Vegas, Gould revealed that first half sales, to the end of December, had topped 630 million dollars, up 125%, and a fortnight later he unveiled handsome profits.

For the last three months of 1983, taking in the Christmas boom, Commodore lifted profits from 29.3 million dollars in the same quarter the previous year to 79.2 million dollars to give a first half profit total of 115.5 million dollars, a rise of 150%.

Nor does there appear to be any sign of a let-up. At the end of January, Gould said Christmas hadn't left American consumers short of money for Commodore 64's, and that "What we are now experiencing is extraordinary demand not only for this microcomputer, but also for the peripheral equipment and software that accompanies it."

This puts Commodore bang on target to achieve the analysts' profit predictions for the year ending in June, which range from 130 to 150 million dollars, after tax.

What could prevent these forecasts being met is the present management upheaval rocking the Commodore boat. In mid-January, Jack Tramiel suddenly resigned, saying "Personal reasons prevent my continuing on a full-time basis with Commodore."

This is the story Commodore is sticking to, but it seems that those personal reasons can be interpreted in a variety of ways. Although Tramiel built up Commodore from nothing to its present billion dollar status, it wasn't achieved without treading on numerous toes.

Former Commodore chief operating officer James Finke — who left the company after a row with Tramiel — still loyally says 'Jack was a terrific marketer and a terrific purchasing guy, exciting, thrilling, frustrating and devastating.'

Others are less charitable. Alan Friedman, former finance director who left last April, said Tramiel 'ran Commodore like a dictatorship.'

At all events, he will be missed. Says Donald Richard, curiously one of four top men hired, fired and rehired by Tramiel: 'There was always the captain of the ship. With the changing marketplace, the turmoil, how will it do without him?'

Captain or no, Tramiel's departure gives Gould an even greater stranglehold on the company. Gould has a larger share stake in Commodore than Tramiel — 18% to 7% — and now he has replaced Tramiel with a personal acquaintance, Marshall Smith, head of the similarly-sized Thyssen-Bornemisza group, which has few links with computers.

'I have personally worked with Mr Smith for more than four years. Commodore needs a Chief Executive that is a known, not an unknown to us,' said Gould. Tramiel, in Gould's eyes, had a "a certain style that can take a company to one billion dollars but can't take it to 10 billion."

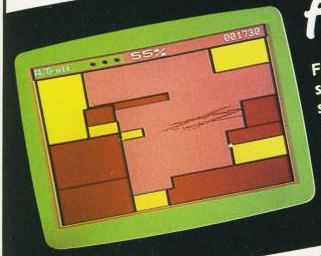
Smith's early words were: 'Commodore has an extraordinary foundation of talented people working for it.'

Alas for Smith, the foundation lost another four of its talents even before he formally took over. Four senior managers resigned, not, Commodore say, because of Tramiel's departure, though one of the four, Donald Richard said it influenced his decision.

SUPERSOFT

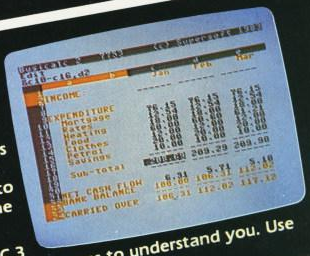
the name to remember

for games



For only £8.95 you can buy a game that's exciting, soothing, and frustratingly addictive – all at the same time! STIX looks so different and sounds so different from all those other games that it will seem like being in another dimension when you sit down to play.

for business



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There's much more for the 64 in the SUPERSOFT catalogue. Ask your computer dealer for a copy, or phone 01-861 1166.

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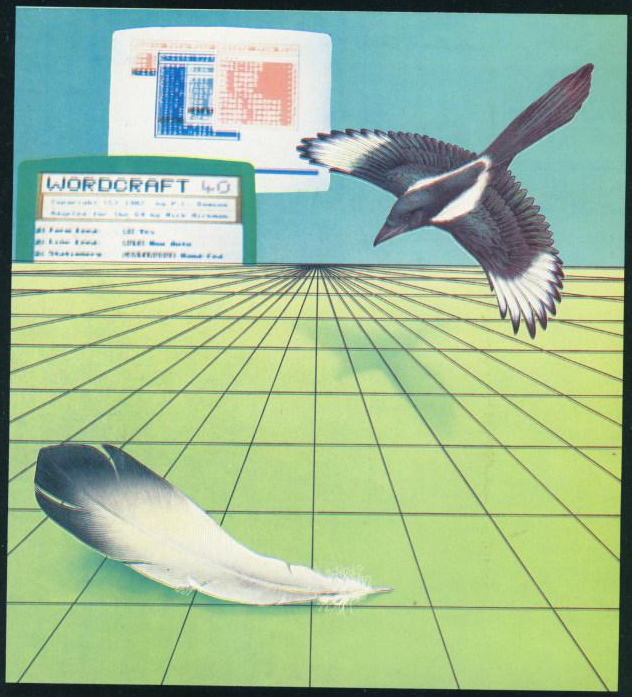

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